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Our Graphics Issue

The Art of Joystick Painting

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And Art Preservation:
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Page 259/260

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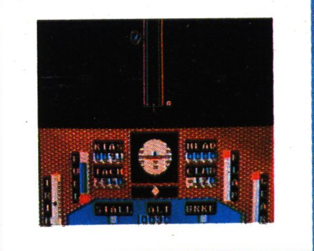

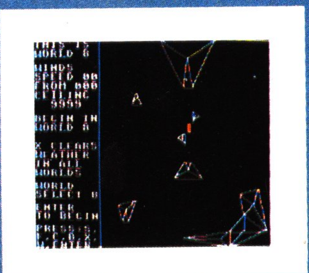

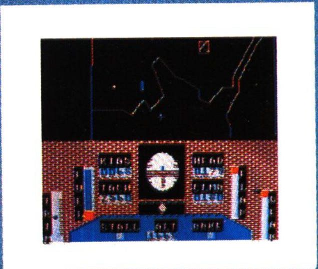

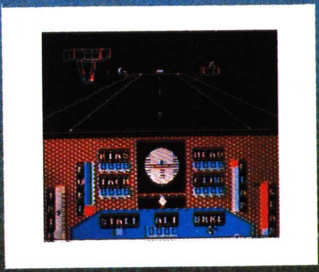

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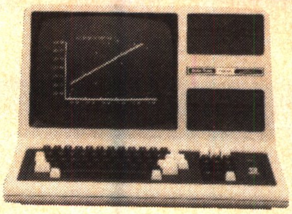

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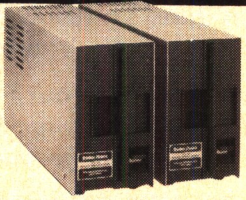

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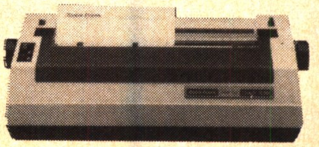

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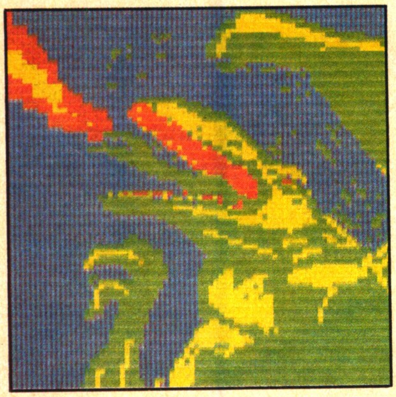
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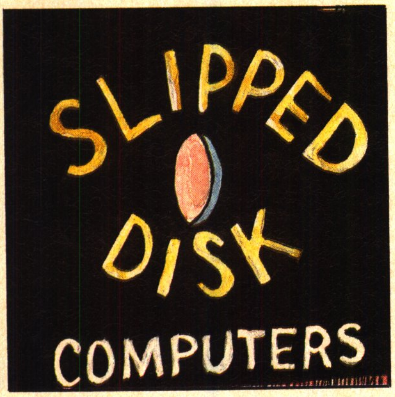

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COVER art © by Fred Crawford

📼 The small cassette tape symbols beside features and regular columns indicate that the program listings with those articles are on this month's **RAINBOW ON TAPE**, ready to *CLOAD* and *RUN*. For full details, check our **RAINBOW ON TAPE** ad on Page 213.

NEXT MONTH: November is our data communications issue, and will include a comprehensive listing of CoCo BBS systems across the country, a terminal program, and a hardware project for adding auto answer to your Modem I. Along with our usual mix, we'll also have a big league "graphics" special for football fans!

We'll have more games, more home use programs, more educational material and more information on our Color Computer than is available anywhere else.

Look for November's Rainbow!

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The RAINBOW

October 1984 Vol. IV No. 3

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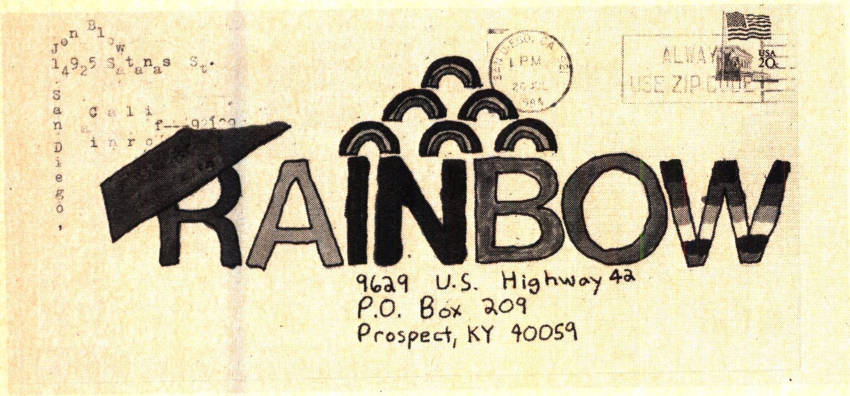
LETTERS TO THE RAINBOW

ARTS AND LETTERS



Envelope Of The Month

Jon Blow
San Diego, CA

A RAINBOWfest ENTHUSIAST

Editor:

I had a really great time at the RAINBOWfest in Chicago and was pleased to see that the exhibit was held in a larger area than 1983's Chicago RAINBOWfest. I not only had fun, but I found it informative and found many good bargains. I will have to say, though, that I spent much time watching demonstrations of *Graphicom*. It was quite a drive from Hopkinsville, Ky., to Chicago, Ill., but it was well worth it. Thanks for the Color Computer's greatest magazine.

Mike Baker
Hopkinsville, KY

KUDOS

Editor:

I am the proud owner of a gray 64K Extended cassette-based CoCo.

I enjoy reading RAINBOW from cover to cover. What I like most is the print. For a Granny this means a lot.

I recently made an index card file for each program in all of my issues. What makes it so nice is that I found all correction updates, too.

I enjoy taking computer classes and buying all the magazines for the CoCo. RAINBOW is number one on my list.

Keep up the good work!

Mrs. Joyce Guttery
Stockbridge, GA

Editor:

"Reviewing Reviews" is one of the most outstanding features of *any* magazine, anywhere. In the April 1984 issue, Page 220, Edward Lowe said it the way it is. He and THE RAINBOW are to be congratulated.

Lawrence Pinter
Yokohamashuchu, Japan

Editor:

I have owned a Color Computer for all of one month now and I already have 11 issues of your fantastic magazine. Every issue I get is something to look forward to. When I read your article on how to upgrade a CoCo 2 to 64K of memory I immediately ordered a set of chips and violated my computer's warranty by opening it up and installing the extra memory. Your instructions were perfectly simple and accurate. The modification worked perfectly and now I can type in all those programs that I was missing because I had only 16K.

By the way, when using your utility *A Bigger Byte For BASIC* (January 1984, Page 74) I noticed that the Reset button causes the computer to revert to normal ROM mode (at least in the 32K mode anyway). I found that a simple *POKE 65503,0* would switch the computer back into all RAM mode without affecting the BASIC program or any variables. *POKE 65502,0* switches to normal ROM mode so I can go between the two at will in case I want to use the speed-up poke.

Thanks for a great magazine and keep up the fine work.

David Voerman
Qualicum Beach
British Columbia

CONSTRUCTIVE SUGGESTION

Editor:

I have been reading RAINBOW for several months and find it interesting and informative. I have, in fact, shifted my subscription from another computer magazine to RAINBOW since it seemed that they were providing less and less for the Color Computer. The one area that I did like, however, was construction (hardware) articles that apply to the Color Computer as well as to others. Thus, I, for one, would be happy to see even more construction articles in future issues of RAINBOW.

Keep up the good work.

John R. Hanson
Winter Springs, FL

HINTS AND TIPS

Editor:

One request that I have heard most on my *Blackjak* program (April 1984, Page 97) is that people would like to see the dealer have one up card as well as the players. For that reason I have included two line changes that should fill the need. I would like to say that I feel RAINBOW is the best thing that happened for our CoCo. Keep up the fine work.

Replacement lines:

```
2120 FOR T=6 TO 7: GOSUB3050:
GOSUB3700: GOSUB2040: IF T=6
THEN GOSUB 3180:GOTO2160 ELSE
PUT(122,4)-(142,34),D:
GOSUB3440: T=2: RETURN

2150 FORX=1 TO 500:NEXT:FOR T=7
TO 10:GOSUB3050: GOSUB3700:IFT=7
THEN GOSUB 3180: GOTO2170 ELSE
GOSUB2040:  GOSUB3180:IF  T=8
  THEN
2180 ELSE IF T=9 THEN 2190 ELSE
IF T=10 THEN 2200
```

Steve Kincade
Toronto, Ontario

A HELPFUL STUNT

Editor:

Regarding my program *Stunt Pilot* as it appeared in THE RAINBOW, March 1984, Page 67, because of a bug in the Extended BASIC ROM and the *PCLEAR5* command in Line 4, when you first type *RUN* ENTER the computer will return "? UL error in 4." Ignore this message. Type *RUN* ENTER a second time and *Stunt Pilot* will run as expected.

If anyone having problems with *Stunt Pilot* will phone me before 10 p.m. (Eastern Time) or write to me (please enclose a self-addressed, stamped envelope), I will do my best to get them "flying." The more detail you give about the problem the better chance I will have to be of help. 313 Sage Rd., 40207; phone (502) 895-4636.

Bob Poppe
Louisville, KY

Editor:

Thanks for publishing Charles M. Thonen's *Mail Mover* in the May issue, Page 75. For me, it certainly paid for a year's subscription to RAINBOW.

Good as it is, I think I have an improvement your readers will like. Adding the following two lines will allow you to see how many records you have made, how many bytes are used and how many bytes are left.

```
180 PRINTY; “=RECORDS”; (LL+
  (30*Y));”= BYTES USED”
190 PRINT@136,(13000-(LL+(30*Y)));”=
  BYTES LEFT”;
```

Doug McLaughlin
Oxnard, CA

Editor:

I just finished running *Mail Mover* by Charles M. Thonen. It is really a super program and for any of your readers who may have had trouble getting it to run on disk, here are a couple extra files.

In addition to Mr. Thonen's fixes found on Page 75 of the May issue of RAINBOW:

1) Delete the negative sign in Line 6140.

2) If lockup occurs with option 9 then delete the high speed poke in Line 8020.

3) My Gemini 10X prints garbage when it encounters *PRINT#-U,""*. To get the same effect just enter a space between the quotes. The lines concerned would be 7200, 7260, 7370 and 7410.

4) I use a green phosphorous monitor and due to that, the edit options' orange cursor was invisible. To get the arrow cursor, change the *CHR$(255)* in Line 2130 to *CHR$(62)*.

5) This next tid-bit is not a fix, just a big help. Add two extra lines:

```
1 GOTO 14000
14000 PCLEAR1:GOTO120
```

6) It wasn't mentioned, but remove the remark sign in front of Line 180. I found it extremely helpful to not only see remaining memory, but the data file name and number of files as well. So I edited it.

```
175 YY=Y-1:IF YY=-1 THEN YY=0
180 PRINTTAB(1)“space=“MEM”file
  “FF$” size”YY
```

As I said before, *Mail Mover* is a super program and befits a super magazine.

Terry Wilson
Baton Rouge, LA

Editor:

If you would like to practice typing or wish to leave a message on your computer, you may not wish to load in or type in another program. In this case, just type *POKE159,0*. Note: After entering this mode, there is no way to escape it.

Jon Blow
San Diego, CA

TIRED FINGERS

Editor:

I enjoyed your *Rainbow Book of Adventures* very much. Although the long hours it took one to type them in, I found the Adventures top rate.

I have started writing an Adventure. I would like to thank you for all your tutorials on Adventures. It has improved my games a lot.

My question is: Will THE RAINBOW be planning another Adventure contest? If so, when?

Nathan Fischer
Ponchatoula, CA

Editor's Note: You missed it! The winners of our second contest will be announced next month. Our third annual contest will be launched next spring, but it's not too early to get started. By the way, we do offer a cassette tape of all the programs in the first *Rainbow Book of Adventures*.

BE 'FORTHFUL'

Editor:

I would like to see some articles on the FORTH language. Surely, there must be many others that have some supplier's version and would join me to request a column on it.

We do have regular columns, now on PASCAL, OS-9, assembly language and BASIC, of course. We will not get (FORTH articles and columns) unless we let ourselves be heard! So, let's be real forthful! Anyway, we must not struggle along on our own, when so many others are being provided with their languages; we must speak up and do it for ourselves!

May the FORTH be with us!

Thomas A. Earl
Greenwich, RI

NEED COCO INFO

Editor:

A call to teachers, publishers, programmers, and users: The school district where I work is installing a computer lab full of CoCos. We would appreciate helpful advice from anyone who has worked with the CoCo in schools. Send replies to 2400 Cornwall Drive, 45385.

James Ventling
Zenia, OH

INFORMATION PLEASE

Editor:

Will some reader please write in with a recommendation (or plans) for a home computer table?

I would like an example of both a purchased and homemade product; allowing for a monitor, disk drive and printer.

Lloyd E. Wing
Owosso, MI

Editor:

I'm a 64K Disk Extended Color BASIC user. As an electrical designer for machine tool control systems, I would be interested in hearing from anyone who has developed a wiring diagram/schematic program for CoCo. Write me at Route 1, Box 29BB, 54157.

Dick Freeman
Peshtigo, WI

Editor:

I am looking for a language translator program. It should meet the following criteria:

1) It must use very little of 16K's memory and be easily adaptable to 32K and 64K, leaving lots of space for data.

2) The screen menu should feature: add a word, delete a word, input/output to tape or disk and translate a word. Other features such as change a word or sort alphabetically could be added. I can always insert a REM at the beginning of these routines.

3) The add and delete functions should be available in both English and the foreign word.

4) The translate function should work as follows: key in the English word and have CoCo print the foreign word to screen. Key

in the foreign word and have CoCo print the English equivalent to screen.

I am willing and able to key the English words and their foreign equivalents into the *DATA* statements, but I am not able to come up with the working "guts" of this program. If any of you hackers consider this a challenge, I would appreciate receiving whatever you come up with. Good Luck! My address is 8376 W. Street, Route 185, 45308.

Greg Ellis
Bradford, OH

A COLLECTOR'S ITEM

Editor:

I have been searching THE RAINBOW and other computer publications for a CoCo program for use in the hobby of postage stamp collecting. It should consist of a program or system of programs that will maintain a stamp inventory and print an inventory list. So far I have not located such a program in these publications or in *Linn's Stamp News*.

If any of your readers know of a source for such programs, I would appreciate a letter telling where they can be obtained. My address is 1410 Shelby Parkway, 33904-5761.

Arthur H. West
Cape Coral, FL

Editor:

I would like a program that would figure interest on U.S. savings bonds from year 1970 to current and be able to update it each year. The bonds have a variable rate which makes it more of a challenge. I haven't been able to find anything on this in any of the computer books or magazines. Any assistance would be greatly appreciated. The bonds are EE Series from $25 to $1000.

Ronald Huntzinger
Wilkes-Barre, PA

Editor's Note: We suggest you look at *Lil' Ole Interest Monitor* in the Sept. 1984, Page 51, issue of THE RAINBOW.

Editor:

How can I make a simple CoCo dialer to use with my modem?

Will someone publish the plans in THE RAINBOW or do I have to buy them?

Tom Mills
Chicago, IL

Editor's Note: See *An Automatic Phone Dialer for Radio Shack's Modem II* in Nov. 1983 RAINBOW, Page 53.

PEN PAL SERVICE

Editor:

I first would like to congratulate your magazine. I can remember when it was just a newsletter! And now look at it!

The reason I am sending this letter is about Micro-Zone Pen Pal service. Pen Pal is a service where people send letters to us and they are forwarded around the world to other users and back again. If the readers would like more information, please send a SASE. We are also forming a computer club.

Write to: Micro-Zone Computers, 7931 N.W. 35 Ct., Apt. 3, 33065.

Jon Jacobs
Coral Springs, FL

CLUBS, CLUBS, CLUBS

Editor:

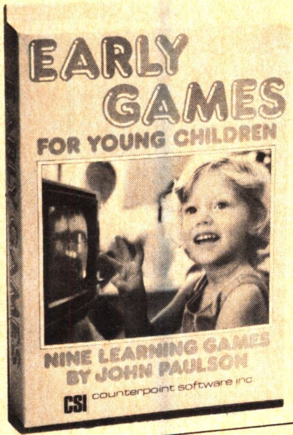
The CoCo'Phile Society of Syracuse is a Color Computer User Group in Syracuse. We meet at the Data'Phile, 207 Melrose Ave., North Syracuse every third Saturday of the month at 8 p.m. For more information, please contact Tim Ashley at (315) 463-6477 or Dan Button at (315) 422-9531 or 672-3694.

Dan Button
Camillus, NY

Editor:

I have formed the CoCo SIG, a special interest group of the Jefferson State Computer Users Group (formerly Jackson Amateur Computer Society) in Medford, Ore. We meet on the first Friday of each month. The main group puts out an eight-page newsletter each month. If you would like more information or would like to receive our newsletter, contact me at 2847 LaMirada, 97504, or call (503) 779-4618.

Andy Dater
Medford, OR



The Best Selling Program for Young Children Now Available for: TRS-80 Color Computer-16K disk or cassette and TRS-80 Models I/III-32K disk or 16K cassette

Nine fun educational games for children ages 2½ to 6

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Educators Endorse: "Early Games can help children learn new concepts, information and skills, and also introduces them to the joys and benefits of home computers."
Peter Clark, Faculty
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No adult supervision required. The Picture Menu gives children control. They can:

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All nine games for $29.95

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Color Computer Disk
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Model I/III Cassette

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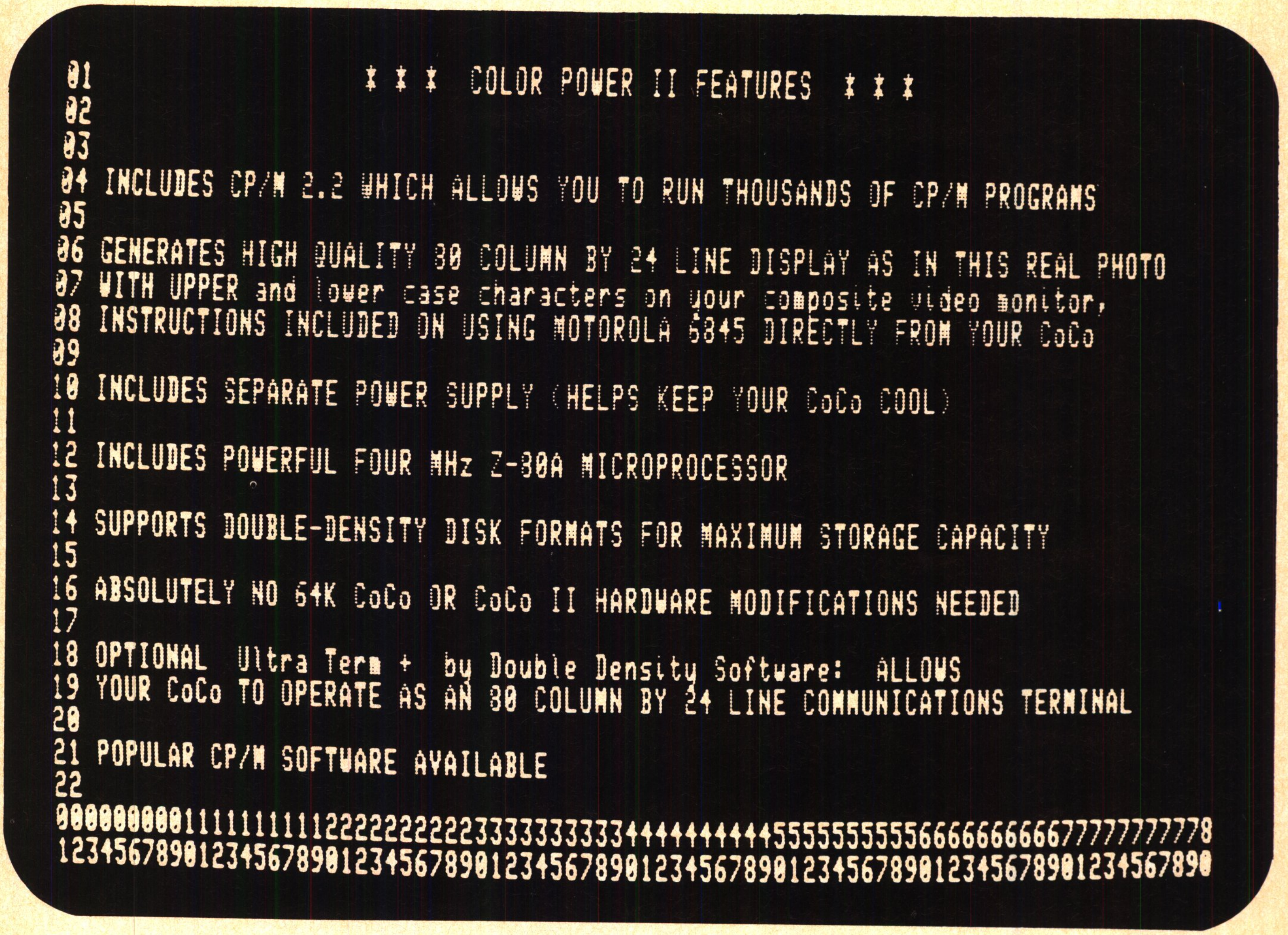
☐ My check for $29.95 is enclosed (Minnesota residents add 6% sales tax).

☐ Charge to VISA ☐ Charge to Mastercard

Acct. No. Expiration Date

Color Power™ II

Expands Your CoCo to CP/M® 2.2



```
01                   * * *  COLOR POWER II FEATURES  * * *
02
03
04 INCLUDES CP/M 2.2 WHICH ALLOWS YOU TO RUN THOUSANDS OF CP/M PROGRAMS
05
06 GENERATES HIGH QUALITY 80 COLUMN BY 24 LINE DISPLAY AS IN THIS REAL PHOTO
07 WITH UPPER and lower case characters on your composite video monitor,
08 INSTRUCTIONS INCLUDED ON USING MOTOROLA 6845 DIRECTLY FROM YOUR CoCo
09
10 INCLUDES SEPARATE POWER SUPPLY (HELPS KEEP YOUR CoCo COOL)
11
12 INCLUDES POWERFUL FOUR MHz Z-80A MICROPROCESSOR
13
14 SUPPORTS DOUBLE-DENSITY DISK FORMATS FOR MAXIMUM STORAGE CAPACITY
15
16 ABSOLUTELY NO 64K CoCo OR CoCo II HARDWARE MODIFICATIONS NEEDED
17
18 OPTIONAL  Ultra Term +  by Double Density Software:  ALLOWS
19 YOUR CoCo TO OPERATE AS AN 80 COLUMN BY 24 LINE COMMUNICATIONS TERMINAL
20
21 POPULAR CP/M SOFTWARE AVAILABLE
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Plug Color Power II into the expansion port of your 64K CoCo or CoCo 2, plug your disk controller into Color Power II, and insert our disk into your drive. You are now ready to run thousands of CP/M programs such as WordStar®, MailMerge®, SpellStar®, and StarIndex™ and to run Ultra Term + to create an 80 column by 24 line terminal.

Your CoCo is now a CP/M compatible computer that includes CP/M 2.2 and generates an 80 column by 24 line display on your 80 column monitor with upper and lower case characters.

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Several menu driven aids to keep your disks clean & tidy

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- R.S. color DOS—16k minimum required.
- Supplied on disk—**$19.95**

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Control access to sensitive programs and files.

- The PRO-LOC loader allows programs to be saved to disk in a password protection mode. The program will not load or run unless proper password supplied.
- Data and text files can also be "locked" with PRO-LOC.
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DORISON HOUSE PUBLSHERS, INC.
824 Park Square Building
Boston, Massachusetts 02116

Editor:

The North Atlanta Color Computer Club is in Atlanta. We meet on the fourth Tuesday at the Tucker-Federal Northlake Mall. Call Chips Inc., 457-2447 for more information or call me at 396-5395. The "old" Smerna CoCo Club is being incorporated. Both clubs are now putting out newsletters. Don't forget about the CoCo Board BBS at 378-4410.

David Gresch
Dunwoody, GA

Editor:

I would like to announce the formation of a CoCo club in the Dranesville District area of Virginia and also the outlying Reston area. This club would be an assembly of interested teens meeting to share interests and their advice with one another. The club would meet at willing members' houses every two weeks. Two of our first members are also planning to run BBS's in the not too distant future. We would like to share our own BASIC and machine language programs, if possible. For more information, call Craig McCormick (703) 281-9352, 9431 Shouse Drive, 22180.

Craig McCormick
Vienna, VA

Editor:

Anyone interested in joining an international MC-10 club can send a SASE for details.

Also, I am running 64K with version 1.1 disk. My ham call is VE3GGR and I am involved in all phases of ham radio including Digital Amateur Radio, SSTV, RTTY, voice, CW, etc. My address is Box 2771, POA 1KO.

L. Stephen Coker
Huntsville, Ontario

GROWERS SEEK NETWORK

Editor:

In the August issue of RAINBOW was a letter from grain farmer Dennis Rogers of Ashton, Idaho, inquiring as to the whereabouts of a program for grain farming.

Well, I am an Idaho farmer also and use the Color Computer in my farming operation. I know there must be many more out there who farm and also read RAINBOW. I would like to see a clearing house started for those involved in agriculture — someplace where we could share our programs with other farmers.

The one drawback I can see about the Color Computer is the relative absence of professional agriculture-related software. Farmers, let's hear from you. I would be willing to get the ball rolling. I have a couple of agriculture related programs I have written for my operation and I would be willing to share them, or trade for some of yours. Even if you have no self-written programs, let's hear from you anyway! My address is Rt. #1, Box 4133, 83301.

Also, thanks to RAINBOW for the best CoCo magazine available!

Kelly Klaas
Twin Falls, ID

BULLETIN BOARD SYSTEMS

Editor:

I would like to announce my BBS in Joplin. It is run on a CoCo computer but open to everyone. The system is on seven days a week from 7 a.m.-12:30 a.m. Call (417) 781-4020.

I would also like to thank you for the best CoCo magazine around. I read RAINBOW from cover to cover every month.

David Morgan
Joplin, MO

Editor:

Colorama BBS of Yonkers is now in operation. Downloads, uploads, boutique, want ads, etc., 24 hours. (9114) 965-7600.

Fred Siudym (SYSOP)
Yonkers, NY

Editor:

I would like to announce the operation of a TRS-80 Color Computer BBS, a modified version of the Silicon Rainbow Products board. Readers may call the BBS anytime 24 hours a day. The number is (209) 835-6496.

Dennis Neatherland
Tracy, CA

THE EVANSVILLE CONNECTION

Editor:

I would like to announce a new BBS has started in the Evansville, Ind. area. The Evansville Connection is on-line Saturdays and Sundays from 9 a.m. to 9 p.m. It features E-Mail, download of CoCo programs, graphics, and news of interest to all CoCo users. The number to call is (812) 476-9453.

Brad Callahan
Evansville, IN

Editor:

Once again we have an announcement about our bulletin board. This time it includes an address change plus many upgrades to the system. Your readers have been the greatest with support of the system sending us uploads for others to share all the time. Some of these being of commercial quality. With the overwhelming selection of downloads and uploads we have gone to a three double-sided, 40-track disk drive system so all this can be made available to all users. Our new address is Westchester BBS, 440-54 North Broadway, 10701.

We are planning a second BBS in the Manhattan area of N.Y. within the next few weeks. The number for the second board will be listed on the BBS in Westchester (914) 965-2355 when we are up and running.

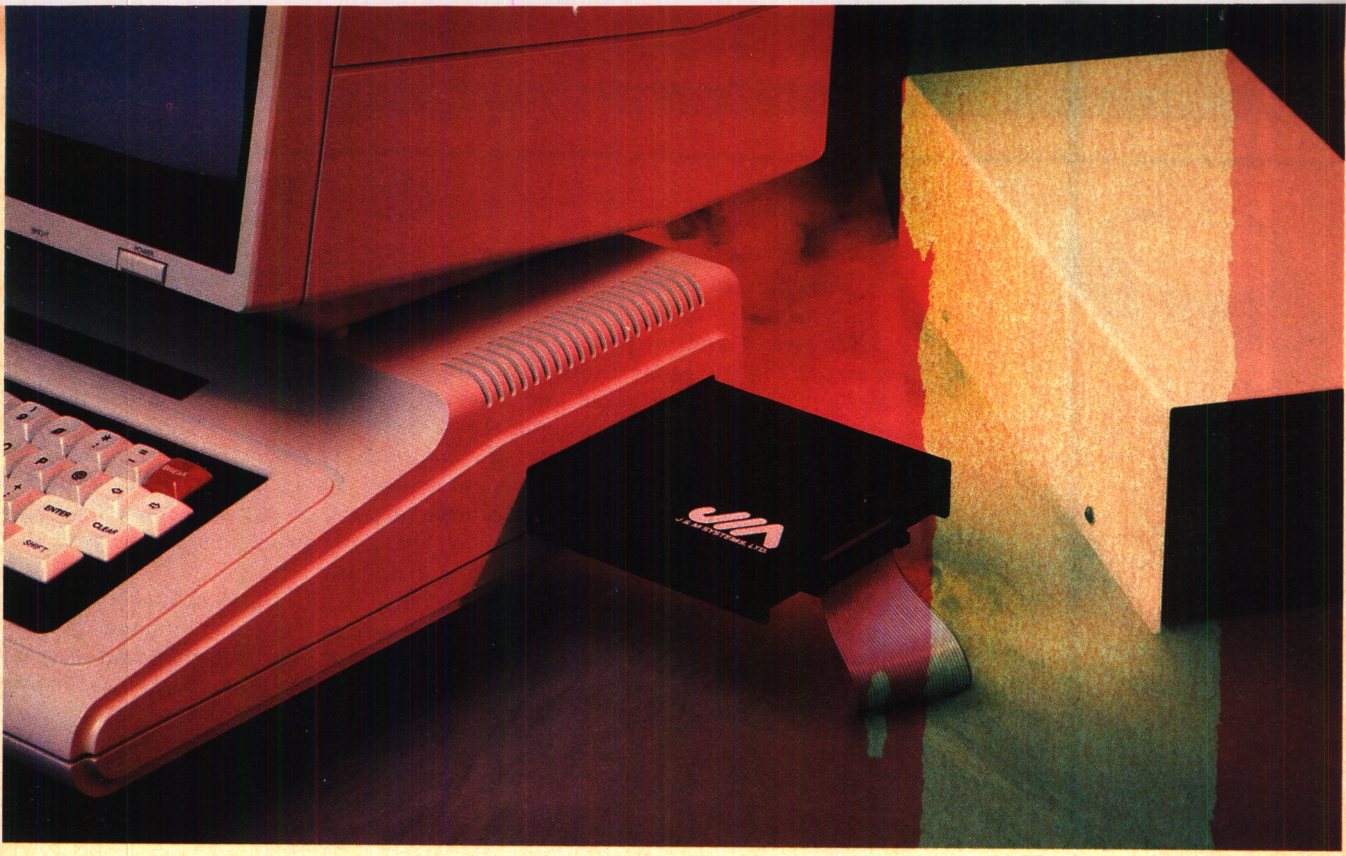
Many thanks for all the help from a great magazine that truly is looking out for the CoCo user and all those who are also helping them out.

Bill Graspo
Yonkers, NY

Editor:

Our three BBSs in St. Joseph, Mo. are on 24 hours. The phone number is (816) 232-4932.

Rick Drozd
St. Joseph, MO



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J&M Systems offers this package for a remarkably low price that gives you a plug-compatible disk drive for **both** the original COCO and the COCO-2.

Gold contacts assure reliability, built-in digital phase locked loop means NO adjustments, and disc operations are supported by **JDOS.** The controller also supports RS DOS, FLEX*, and OS/9*.

JDOS implements all RS DOS Basic commands, plus many more, including Auto line numbering, DOS to boot OS/9, and RUNM to load and run machine language programs.

You may also **choose** to format disks 40 track (single or double side) as well as 35 track RS compatible. Up and Down arrow keys support **scrolling:** a feature everyone wants!

VIP-Writer, gold-edged **JFD DISK CONTROLLER** card, **JDOS** in ROM, complete drive, cable, and Manuals: all for only **$379.**

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PRINT #-2,

I am going to break one of our rules this month. Historically, I have felt it improper — or inappropriate — for THE RAINBOW to comment editorially in any way on our own competition.

I made this rule for a reason. First of all, we have always had competition in some measure and I just believed that it would not be "right" for us to use our own editorial pages to say things about the state of the market.

Second of all, we as publishers of a magazine, always make a lot of subjective decisions; not the least of which is in our reviews. We spend a great deal of time on reviews —wishing them to be as accurate as possible. We also want them to be impartial and objective and, in some way, I have always felt, in order to ensure that, we should avoid taking a partisan stance in any way.

The way this goes is to say that if we are partisan in one area, what keeps us from being partisan in others? I spent more than a decade in the news business with a newspaper in Birmingham, Ala., and with United Press International. The one thing we were told in all of these situations was that journalism and advocacy do not mix.

Certainly, newspapers have editorial pages, where they express opinions. And, it might easily be argued, this column is — in a way — an editorial page. But, frankly, I have always felt you would rather read about things here other than the magazine business. Particularly from our perspective.

I have departed from this "rule" twice. Once when another magazine decided to cut out THE RAINBOW Seal of Certification from any advertisements appearing in it and the other when a competitor folded. In the first case, I was concerned that someone viewed the Seal as a publicity ploy by THE RAINBOW, especially since no other CoCo (or computer) magazine banned the Seal from its pages. In the second instance, we were getting a lot of questions about the status of another competing magazine that went out of business and I felt it was our "duty" to, at least, inform as many people as we could that this was the case. To my knowledge, no formal announcement was ever made by that magazine.

So, perhaps, history repeats. By now, many of you may be aware that *The Color Computer Magazine* is terminating publication with its October issue. It is my understanding that subscribers to that publication *will* receive notice of its demise and be offered a subscription to a non-CoCo specific computer magazine in its place. Don't hold me to the latter information, though.

In a way, we feel sad to see *The Color Computer Magazine* leave the field. It was an intensely competitive journal — in the editorial, subscription acquisition and advertising sales fields. Kerry Leichtman, its editor-in-chief, was interested in the Color Computer and succeeded, I think, in putting out a publication of professional quality.

So, the CoCo World is evolving. An important aspect of all this is the impact which the existence of several CoCo publications has had on the market. My feeling, expressed many times in private, is that I believe it hurt the market more than it helped.

I recall when *The Color Computer Magazine* and another competitor, *Hot CoCo*, first began publishing. All of a sudden, advertisers were telling me that now they had a way to go after even more sales. Readers were saying that they had the opportunity for even more information. It did *look* beneficial to everyone.

That turned out not to be so. Readers found out they were spending an inordinate amount of money on magazines — money which could have been used for other purchases. Advertisers, by and large, discovered that the added sales they gained were miniscule compared to added costs. And they had to recover that added advertising cost somehow — and, of course, it came from you.

From the day THE RAINBOW began as a two-page newsletter, I have always believed we need to serve the reader first. But, as some fierce and well-funded competition developed, we spent some money on things we otherwise need not have — such as subscription promotions. These promotional costs were reflected in increased cost for subscriptions.

Telewriter-64™

the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
>
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW
CERTIFICATION
SEAL

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
>
> — The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

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Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited.

(Add $2 for shipping. Californians add 6% state tax. Allow 2 weeks for personal checks. Send self-addressed stamped envelope for Telewriter reviews from CCN, RAINBOW, 80-Micro, 80-U.S. Telewriter owners: send SASE or call for information on upgrading to Telewriter-64. Telewriter-compatible spelling checker (Spell 'n Fix) and Smart Terminal program (Colorcom/E) also available. Call or write for more information.)

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WHY NOT!

HOW? PRACTICE THRIFT AND PLAN WISELY. THE THRIFT IS UP TO YOU, BUT FOR PLANNING . . .

YOU NEED THE

RETIREMENT PLANNING MODEL

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By the year 2010, today's $8800 auto will cost $40,000 if inflation averages 6%. Inflation makes retirement planning essential. Proper retirement planning requires a complex year-by-year analysis which must consider these factors:

- Your investment program
- Tax-deferred savings
- Social Security
- Inflation
- Pension
- Taxes

START NOW
Start your planning now. Try different retirement ages and vary your investment program goals. The objective is to develop a plan for early retirement which eases doubt regarding your future financial security.

WHAT THE MODEL DOES
First, the model helps you organize your present assets. The model then projects these assets, along with estimated pension and social security, to the retirement age you select. Based on this projection, a detailed cash flow analysis is conducted for each year of your retirement.

The factors listed above are considered in all calculations. Each analysis stops when your funds deplete or when the analysis carries to the age of 100. The model is designed for "what if" analysis and optional printer output.

AN ESSENTIAL TOOL FOR COMPREHENSIVE RETIREMENT PLANNING

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FULLY DOCUMENTED

ABOUT THE AUTHOR
From the author of "Real Estate Investment," "Bond Analysis," "Owner Financed Real Estate" and "Homeowner Selling Analysis" as featured by Petrocci Freelance Associates.

REQUIRES 16K EXTENDED COLOR BASIC

ILL. RESIDENTS ADD 8% SALES TAX

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Glenview, IL
60025

RAINBOW CERTIFICATION SEAL

Certainly, some will argue that competition has made us a better publication, and, in a number of cases that is, indeed, so. But I would like to believe that we would have done the same *reader-oriented* things anyway. After all, we began typesetting THE RAINBOW when there was no competitive compulsion to do so; we instituted a "slick" format because we felt the CoCo deserved it; we added color, increased the number of pages and came up with unique ideas simply because we wanted to. And, we'll keep on doing so with or without competition.

What is the "bottom line" on all of this, as the business people say?

First of all, it means we probably will be able to cut back on the price increase we have been looking at for subscriptions at the end of the year. We will still probably have a slight increase — simply because the cost of paper and postage keeps going up — but, by eliminating some of the non-reader-oriented things we have had to do, we will be able to operate a little more economically. And we can pass that savings on to you.

Second, it means we will most likely be able to hold the line on advertising rate increases for a while. This may not seem important, but it is. Paul Searby of Computerware, for example, has often voiced the problem of the high cost of bringing a product to market — and that certainly includes cost of advertising. This means more affordable software because it reduces a software company's expenses.

It also means more companies have a chance to *get into* the business in the first place. We started THE RAINBOW on a $2.50 investment (excluding our CoCo, which we already had) and we've always tried to encourage new businesses in our market. Holding the line on ad costs simply makes it possible for access to our advertising to be more affordable. Honestly, I am proud of the many companies which started with THE RAINBOW and have built themselves into nice businesses through our advertising.

I am not trying to say that the demise of a single magazine means a whole new world is waiting out there, but I do think this development is reflective of several significant changes that are taking place. For those in the publishing business, it is always disturbing when a publication dies — even if that publication was a competitor. To Kerry and others associated with *The Color Computer Magazine* go our best wishes and hopes for success in the future. They produced a good magazine and should be proud of their efforts.

Don't let me forget about RAINBOWfest! The first show of our new season is coming up Sept. 28-30 in Princeton, N.J. There is, of course, a ticket order form in this issue.

RAINBOWfest-Princeton looks like it is going to be an outstanding show and we sure want you to come. We have a special discount fare from our official airline, United, and a special discount rate from our official car rental agency, National. An added bonus: Since it is so close to my birthday, we're serving cake on Friday night to everyone who attends. There are a couple of things we have up our sleeve. I think this is one show you really won't want to miss!

Please come to RAINBOWfest. It will be nice to see everyone again. And, you Easterners, remember that the Midwest took the show attendance "record" away from you last spring. Now, you can get it back.

By way of finally, I also wrote last month about our plans to publish several new books in the coming months. They will be marketed under the general heading of *The Rainbow Bookshelf*, although they will still be called *Rainbow Books*. You'll be seeing *The Rainbow Bookshelf* logo in the coming months.

— Lonnie Falk

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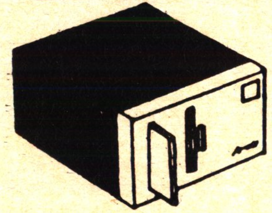

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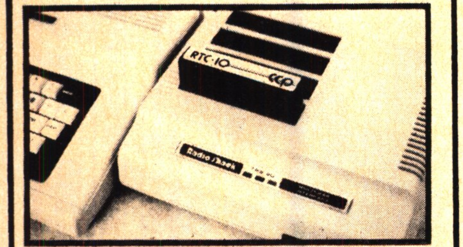

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Everyone Wants More RAM . . .
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It's A Matter Of Give And Take . . .

"Memory is getting cheap," says Dale Puckett in this month's installment of his "KISSable OS-9" column, adding that "64K is not enough." Obviously, the technological promise is for more and more memory in smaller and smaller packages. While that forecast carries with it the prospect of higher resolution, more features and sundry other extras, I'd have to argue that increased memory has its expensive side, too.

You see, the longer that program listings get, the more space they take up in THE RAINBOW and, thus, we have fewer pages left for other articles. While THE RAINBOW's phenomenal growth has helped offset the effects of longer listings, we have begun to feel the squeeze. The submissions just keep getting longer. I suppose that most writers have had their machines awhile and have elected to upgrade to more memory, and, once having done that, it's difficult to resist the temptation to use all available memory in programs under development.

Now, I'm not suggesting we go back to 4K, nor am I preaching about efficiency in programming. It's just that I'm in a quandary as to how our magazine should evolve. We feel a strong commitment to publishing all listings, in their entirety. But, if the longest are the best — and you're unlikely to do in 16K what you can in 32K — the direction this leads us in is toward fewer articles and longer listings. In our recent Adventure contest, for instance, we've received games that keep accessing the disk as the game progresses — and some fill an entire disk and would take an entire issue of THE RAINBOW to print! At what price excellence?

Few would argue the point that the longer our listings are, the less likely people are to type them in. Thus, as we continue our commitment to publish all listings, the result is that increasing blocks of pages are being used by fewer and fewer people — percentage-wise, at least. A peculiar situation when you think about it: programs are the meat of THE RAINBOW, yet could we have too much meat? It would appear so. As good as the longer listings are, we could run two or three short articles with programs in the space devoted to some of the longest listings — and, after all, many readers have 16K systems and can't use the "biggies" anyway. What to do?

Run just the shorter programs? How can we if the longer listings are the best? Print just the articles and direct readers to our RAINBOW ON TAPE service? RAINBOW ON TAPE is a valuable adjunct, but we're a magazine first. There is much to be learned from scanning a listing, even if you don't type it in; that's the best way to learn BASIC programming. Bar code? No, we use it in a sister publication, but it takes up more space than a BASIC listing — and only your computer can read it! Soundsheets? Too expensive. Print listings three columns per page instead of two? Maybe we should. Maybe we must. What do you think?

Clearly, we must rely increasingly on THE RAINBOW's program evaluation process, which is already an intensive, time-consuming editorial activity. Longer programs? Absolutely, if they are worth the room they take up and appeal to a large segment of our readers. But, mainly, we'll be striving for a delicate balance, a mix. We'll also encourage writers to weigh the "expense" of a long program when maybe a shorter version would do almost as well. And, we'll remind our writers that they were beginners once, too, and didn't they enjoy those "program quickies" that could be typed in only a few minutes. You see, more memory has its expensive side, too.

If you share my concern for cutting expenses, here's the worn but worthy tip I usually close with: subscribe to THE RAINBOW and save; we'll send you about 128K in programs every month — more K at less price!

— Jim Reed

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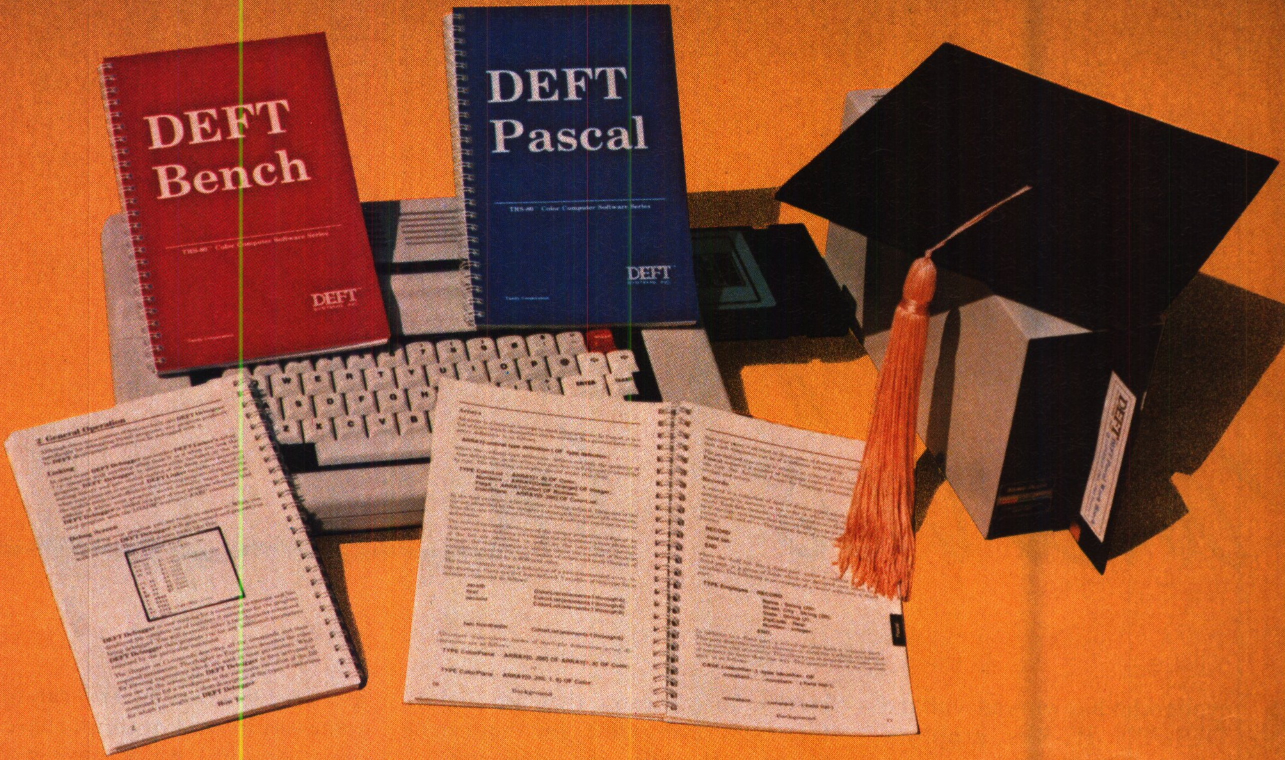

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GRAPHICS UTILITY

Creating Moire Patterns in

Anyone who has worked with the TRS-80's Hi-Res graphics knows that they are far from perfect. When you put various lines near each other, they might be in different colors. This is known as the moire (mor-AY) effect. Using this fault of the computer system, and optical illusions created by crowded lines, I discovered that it is possible to get eight colors on the *PMODE 4* screen, not including the background color! This creates incredible possibilities. Apparently, Radio Shack and Motorola realized this when creating the 6809 — the special effect only happens when using *SCREEN 1,1*. This is useful, because the colors are hard to control, and could pose a problem when not wanted (i.e., drawing electrical schematics). If you end up with unwanted colors in your Hi-Res programs, then use *SCREEN1,0* (more information can be found in Chapter 4, *Going Ahead With Extended Color BASIC*).

The first program is titled *8-COLOR*. It shows eight lines on the screen, each one a different color. You may have to adjust some of the controls on your TV to tell the difference, but the difference is there. I won't give names for the different colors, because they are slightly different on every CRT, and they can be altered by the color and tint controls.

Line 50 draws a vertical line in an even-numbered column (100). Line 60 draws a vertical line in an odd-numbered column (121). The others use the moire effect to create other colors by blending lines that are next to each other. As far as I know, horizontal lines are the same color at all times.

The second program shows a true moire pattern. Before computers, moire patterns were two designs on transparent materials that created optical illusions when placed one atop another. Often, one was a set of concentric circles, and the other consisted of many lines going from the middle to a little more than the outermost circle. (See Figures 1 and 2.) This program draws 85 lines in *PMODE 4*, from (129,0) to the bottom of the screen in steps of three, from (0,191) to (255,191). Without the space, it would look like a triangle at the bottom of the screen, and with a larger space the optical illusion wouldn't exist.

When the patterns of Figure 1 and Figure 2 are placed on top of each other the moire pattern is formed.

The third program is one that caused much frustration when we wrote it, and sometimes an FC Error will still result, but very rarely. It randomly picks two points, and draws a line between the two. Then it moves both points and draws a new line. When the point hits the end of the screen, it will bounce off at a 45-degree angle. This can result in some very interesting turns. I have added many options, which have made the program much more enjoyable, but can easily be removed to save time and memory by deleting Lines 240 to 320, and 350 to the end.

The CLEAR key will clear the graphics screen, because after awhile the screen will look jumbled. Hitting 'E' will End the program, and the computer will tell you the coordinates used. 'S' will let you change the Step increment (or gap between lines). This is set by the computer at four when you start. 'W' will run a new random line using your specified Step increment, while 'R' will Run a new random line using the computer's set gap of four. 'P' wil Pause the program (like SHIFT and '@'), but you must hit 'P' again to continue. 'O' will run the same pattern Over again and 'C' will Change screens (from *SCREEN 1, 1* to 1, 0 or 1, 0 to 1, 1), to show you how to prevent the various colors. 'H' will display a Help menu in case you are like me and will forget which letters to use.

The fourth program is a demonstration of my favorite pattern from the bouncing lines program. To fully appreciate it, you must wait until it starts overlapping itself, then pause it and play with the color controls. It contains no options, because there is no need for them.

I would like to know if someone can figure out how to make the third program 100 percent errorless.

(Paul Faulstich is a 15-year-old student at Somerville High School in New Jersey. He uses his computer to write school reports, letters to his paper route customers; to learn about programming; and for fun.)

16K
ECB

PMODE 4

By Paul Faulstich

Listing 1:

```
10 REM 8 COLORS IN PMODE 4
20 PMODE4,1
30 PCLS
40 SCREEN1,1
50 LINE(100,0)-(100,191),PSET
60 LINE(121,0)-(121,191),PSET
70 LINE(130,0)-(130,191),PSET:LI
NE(131,0)-(131,191),PSET
80 LINE(151,0)-(151,191),PSET:LI
NE(152,0)-(152,191),PSET
90 LINE(169,0)-(169,191),PSET:LI
NE(170,0)-(170,191),PSET:LINE(17
1,0)-(171,191),PSET
100 LINE(186,0)-(186,191),PSET:L
INE(187,0)-(187,191),PSET:LINE(1
88,0)-(188,191),PSET
110 LINE(201,0)-(201,191),PSET:L
INE(202,0)-(202,191),PSET:LINE(2
03,0)-(203,191),PSET:LINE(204,0)
-(204,191),PSET
120 LINE(212,0)-(212,191),PSET:L
INE(213,0)-(213,191),PSET:LINE(2
14,0)-(214,191),PSET:LINE(215,0)
-(215,191),PSET
130 GOTO 130
```

Listing 2:

```
10 PMODE 4,1
20 PCLS
30 SCREEN1,1
100 FOR T=0 TO 255 STEP3:LINE(12
9,0)-(T,191),PSET:NEXT
200 GOTO 200
```

110 79
340 206
END 77

Listing 3:

```
10 REM BOUNCING LINE
20 Q=4
30 SCR=1
40 PMODE4,1
50 PCLS
60 SCREEN1,1
70 V1=Q:V2=Q:V3=Q:V4=Q
80 REM STRING ART DESIGN
90 X=(RND(INT(255/Q)))*Q:Y=(RND(
INT(191/Q)))*Q
100 A=(RND(INT(255/Q)))*Q:B=(RND
(INT(191/Q)))*Q
110 SA=A:SB=B:SX=X:SY=Y
120 A=A+V1
130 B=B+V2
140 X=X+V3
150 Y=Y+V4
```

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```
160 IF A=(INT(255/Q)-1)*Q THEN V
1=V1*-1
170 IF B=(INT(191/Q)-1)*Q THEN V
2=V2*-1
180 IF A=<0 THEN V1=V1*-1
190 IF B=<0 THEN V2=V2*-1
200 IF X=(INT(255/Q)-1)*Q THEN V
3=V3*-1
210 IF Y=(INT(191/Q)-1)*Q THEN V
4=V4*-1
220 IF X=<0 THEN V3=V3*-1
230 IF Y=<0 THEN V4=V4*-1
240 A$=INKEY$:IF A$="E" THEN 350
250 IF A$="S" GOTO 600
260 IF A$="R" THEN RUN
270 IF A$=CHR$(12) THEN PCLS
280 IF A$="P" GOSUB 380
290 IF A$="O" THEN 390
300 IF A$="H" GOSUB 430
310 IF A$="C" GOSUB 580
320 IF A$="W" THEN 30
330 LINE(X,Y)-(A,B),PSET
340 GOTO 120
350 CLS:PRINT:PRINT"THE VARIABLE
SX,Y,A,B WERE:":PRINTSX,SY,SA,SB
360 PRINT:PRINT
370 END
380 X$=INKEY$:IF X$<>"P" THEN 38
0 ELSERETURN
390 X=SX:Y=SY:A=SA:B=SB
400 V1=Q:V2=Q:V3=Q:V4=Q
410 PCLS
420 GOTO 120
430 SCREEN0,0
440 CLS
450 PRINT"          help"
460 PRINT" 'E' = eND"
470 PRINT" 'S' = sTEP CHANGE"
480 PRINT" 'R' = rUN"
490 PRINT" 'P' = pAUSE"
500 PRINT" 'CLEAR' = clear
510 PRINT" 'O' = RUN oVER"
520 PRINT" 'C' = cHANGE SCREEN"
530 PRINT" 'W' = RUN wITH NEW IN
CREMENT"
540 PRINT" 'H' = hELP"
550 INPUT" PRESS 'ENTER'";ZZ
560 SCREEN1,1
570 RETURN
580 IF SCR=1 THEN SCR=0 ELSE SC=
1
590 SCREEN 1,SC:RETURN
600 SCREEN 0,0
610 CLS
620 INPUT" WHAT IS THE STEP INCR
EMENT YOU  WANT";Q
630 SCREEN1,1
640 GOTO 30
```

Listing 4:

```
10 PMODE4,1
20 PCLS
30 SCREEN1,1
40 V1=4:V2=4:V3=4:V4=4
50 REM STRING ART DESIGN
60 X=132:Y=148
70 A=56:B=112
80 LINE(X,Y)-(A,B),PSET
90 A=A+V1
100 B=B+V2
110 X=X+V3
120 Y=Y+V4
130 IF A=252 THEN V1=V1*-1
140 IF B=188 THEN V2=V2*-1
150 IF A=0 THEN V1=V1*-1
160 IF B=0 THEN V2=V2*-1
170 REM ALL DONE FOR A AND B
180 IF X=252 THEN V3=V3*-1
190 IF Y=188 THEN V4=V4*-1
200 IF X=0 THEN V3=V3*-1
210 IF Y=0 THEN V4=V4*-1
220 GOTO 80
```

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The Computer As A Classroom Tool

By Michael Plog, Ph.D.
Rainbow Contributing Editor

From time to time I get mail from people, either wishing to express a point of view, disagreeing with me about something, correcting a mistake I make, or simply sharing ideas. This month I would like to respond publicly to a letter from a teacher. Gary Gernert teaches social studies in Waynesburg, Penn. Through a strange combination of events, the social studies department is now in charge of 16 Color Computers which must be "incorporated into the regular classroom." Mr. Gernert is coordinator/advisor for this task.

The problem is that while the Color Computer represents a superior piece of equipment, there is not much educational software for secondary social studies classes. So, gentle readers, I give you a problem to ponder and an outlet for your creativity. If any of you know of any good programs for secondary social studies, please get in touch with Mr. Gernert. Also, for you programmers out there with a really great software package, why not send it to him? If you want to sell your software, why not let the students in Waynesburg field test it for you? Professional programmers and software houses would be well advised to have students and teachers field test software. The marketing advantages of classroom tested material are well known, and appreciated by buyers.

(Michael Plog received his Ph.D. degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district, and currently is employed at the Illinois State Board of Education.)

> ***"The computer is a tool of education. It is only one tool, and should be used with other tools by professional educators to provide a set of growth experiences for students."***

Please recognize that Mr. Gernert is not asking for free software. That idea is mine; I am asking for him. His letter to me was simply asking if I knew of any good educational programs for his classes. In fact, if anyone writes to me and asks for free software, I would probably not be sympathetic or overly helpful. I do not know anything about the materials budget for Waynesburg, but I expect they have some money to purchase software.

This plea is only part of the article for this month. It seems to me there are other points to be considered in the situation described above.

The computer is a tool of education. It is only one tool, and should be used with other tools by professional educators to provide a set of growth experiences for students. When we think of computers in schools, let us not get carried away with Computer Assisted Instruction. Yes, it is a significant tool for the teacher. But, there are other ways to use a computer in school.

Consider for a moment CMI — Computer Managed Instruction. With a simple database program, the students in Waynesburg could have their records computerized. Teachers in the social studies department could keep scores from tests and classroom work stored on diskette. A simple BASIC program could transfer the information from a database program to a listing of grades. Now, I do not know how grade cards are handled in Waynesburg. My own experience was many hours with a calculator, then even more hours in the teachers' lounge waiting for the cards for seniors, names beginning with L-Z. Imagine having your Color Computer go through the database information, averaging scores (with weights) and printing a list of students and grades. The time spent transferring that to the grade cards would be almost nothing! I can picture a group of social studies teachers, with coffee cups in hand, joking among themselves while the other department teachers are frantically trying to find that one grade card that fell behind the chair.

Grades are only one example of CMI. Why not have attendance taken by the computer? Students could key in their name (or ID number) when arriving in class. By the time announcements are made and homework papers collected, a printout of present and absent students would be waiting for the teacher.

For classes involving reading assignments, the Color Computer is an ideal tool to keep track of material completed by each student, as well as dates of completion. This type of use might also involve a database system. Output might possibly not even need additional BASIC programming. A simple listing of assignments completed and not completed might be all the teachers want from this system.

An ambitious project for the classroom would be to put tests on the computer [Check last month's "education issue" of THE RAINBOW for some good ones.]. Such a program would have to be able to accept different questions (as the tests change) and keep scores saved on diskette or tape. Security would have to be part of the system, so students could not change grades or items missed on the test. Output for teachers would be a listing of students and scores (maybe dates also), and a listing of students who have not yet completed the test. This would only work in an extremely individualized classroom — with students taking tests at different times during the day.

I will not go on with these examples. I am sure you readers have already thought of an example from your situation that fits with the general thread presented here. The point is that computers can be used for many purposes involving management of instruction.

There are other aspects of using the computer as a tool for education. Many years ago, I taught a sociology class in high school. One project we had in class was to conduct a sociological study in the community. The students selected the topic of "generation gap" to be studied. (Yes, this was many years ago, when that term was popular.) The class constructed a questionnaire that asked for opinions on a variety of topics — the war in Vietnam, abortion, political preferences, and other items I cannot remember. We administered this questionnaire to students in the school, and asked them to take copies home to have their parents complete. We then submitted the results to statistical techniques to determine if indeed parents and children held different views.

"A curriculum that includes the computer as an integral part of student learning, but as only a single tool, would be a truly innovative aspect for American education."

The students got firsthand experience in what a sociologist does for a living, and learned what some of the readings in class were all about. Unfortunately, they had to spend many class hours with calculators to get the statistical results. This was time away from the main lesson, but was something that had to be done. I did not have a computer at that time; in fact, no one had a microcomputer. But had that class been able to use a microcomputer to store and examine the results, we would have had more time to spend on the analysis, and probably conducted several other tests of the data. This would be an ideal example of using the computer as a tool for an educational experience. Instead of having to teach about computers, or having lessons from computers, the students would have had a practical application of the use of computers in a real life experience.

I am not suggesting that students in Waynesburg conduct a sociological study with the use of the Color Computer. I am suggesting that similar applications could be instituted in the social studies department.

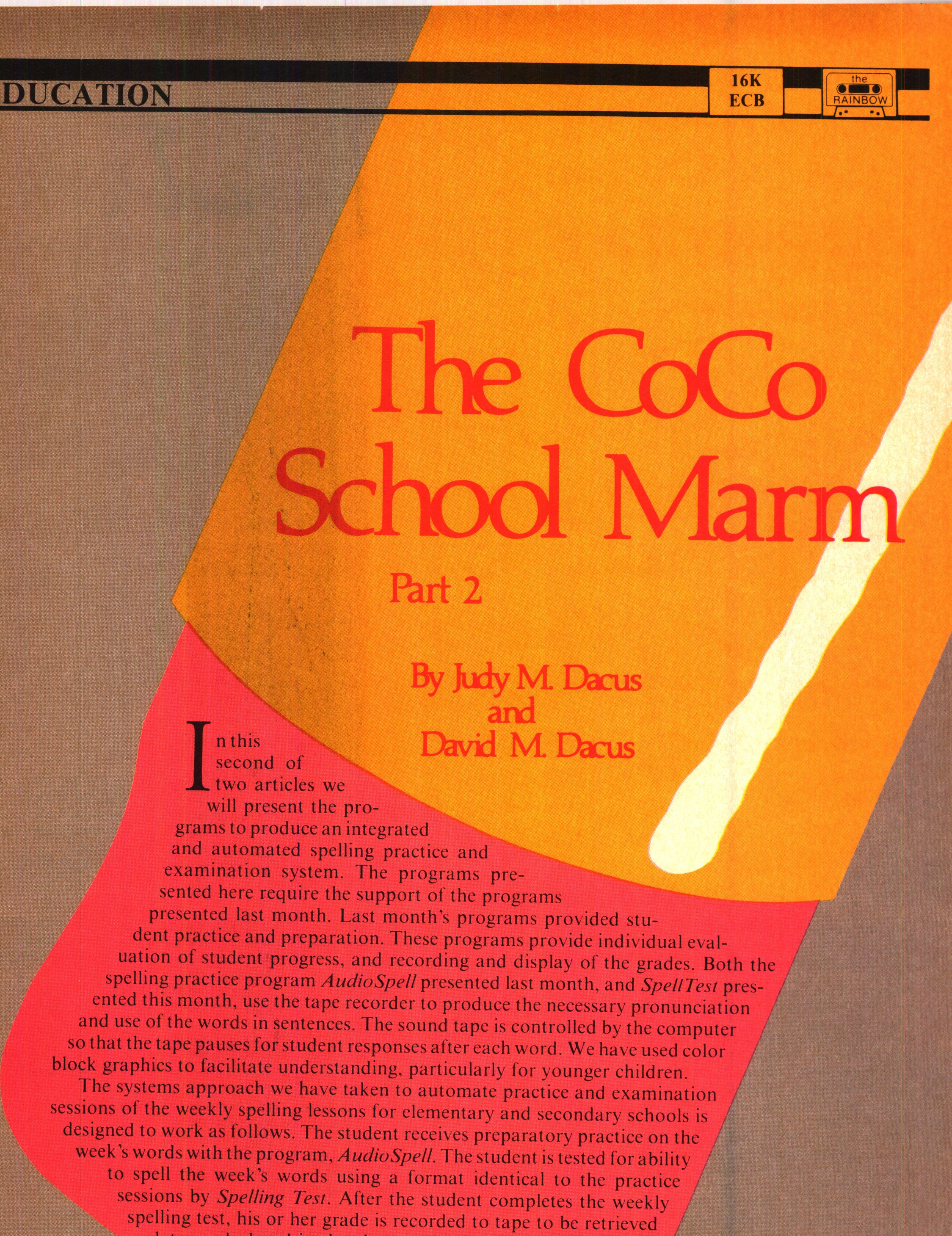
Another brief example comes to mind (and then I promise to stop with the examples). Another class I taught was economics. This was not "how to balance a checkbook" economics, but the theory of economic behavior of humans. Much of the class time was spent dealing with numerical data: stock market quotes, corporate balance sheets, foreign trade, etc. If a computer had been available to me at this time, the entire course might have been different. By putting some of the material we had in a spreadsheet program, the students could have gained a much better understanding of demand, supply, profit, and other economic concepts.

The computer has many more uses in schooling than simply "drill and practice." A curriculum that includes the computer as an integral part of student learning, but as only a single tool, would be a truly innovative aspect for American education. I know of no such curriculum. Perhaps we will see such a set of educational experiences for Waynesburg. I hope so.

The social studies faculty and students at Waynesburg have a unique challenge. The thing about challenges is that they cut both ways. There is no other way to grow and learn than to be faced with a challenge. However, the risk of failure is always present. To reduce the risk as much as possible, I would give one more piece of advice to Mr. Gernert. Develop a plan for computer use in your schools. Do not try to overload the use, but determine what the machines will be used for, and how they will be used. Good luck to Waynesburg!

For those who have information, advice, software for Mr. Gernert, please send it directly to him at 401 Bridge Street, Waynesburg, PA 15370. Sending anything to me will only delay forwarding to Waynesburg. If you want to communicate with me, please feel free to write me at 829 Evergreen, Chatham, IL 62629.

Until next month, keep on developing challenges for yourself.



The CoCo School Marm

Part 2

By Judy M. Dacus
and
David M. Dacus

In this second of two articles we will present the programs to produce an integrated and automated spelling practice and examination system. The programs presented here require the support of the programs presented last month. Last month's programs provided student practice and preparation. These programs provide individual evaluation of student progress, and recording and display of the grades. Both the spelling practice program *AudioSpell* presented last month, and *SpellTest* presented this month, use the tape recorder to produce the necessary pronunciation and use of the words in sentences. The sound tape is controlled by the computer so that the tape pauses for student responses after each word. We have used color block graphics to facilitate understanding, particularly for younger children.

The systems approach we have taken to automate practice and examination sessions of the weekly spelling lessons for elementary and secondary schools is designed to work as follows. The student receives preparatory practice on the week's words with the program, *AudioSpell*. The student is tested for ability to spell the week's words using a format identical to the practice sessions by *Spelling Test*. After the student completes the weekly spelling test, his or her grade is recorded to tape to be retrieved later and placed in the class gradebook. The *Word Load* program provides an easy means of placing the week's spelling words on a data tape for either the *AudioSpell* or the *Spelling Test* programs.

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Sept. 28-30

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Sunday — Exhibit Hall open from 11 a.m. to 4 p.m.

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Our Princeton, New Jersey, show is being held at the Hyatt Regency Princeton, which offers special rates for **RAINBOWfest**. The show opens Friday evening with a 7 p.m. to 10 p.m. session. It's a daytime-only show Saturday — the CoCo Community Breakfast is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs continuously until 6 p.m. There will be no exhibition hours or seminars Saturday evening. On Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

Our highly popular CoCo Community Breakfast will again feature a well-known figure from the Color Computer Community. And the exhibition will be interspaced with a number of seminar sessions on all aspects of CoCo — from writing in machine language to making your BASIC work better.

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RAINBOWfest Princeton

Seminar Program And Speakers

- **Frank Hogg** — **Advanced Operating Systems**

Frank is the president of Frank Hogg Laboratory and a forerunner in FLEX and OS-9 systems.

- **Jim Reed** — **Writing For RAINBOW**

Jim, managing editor of THE RAINBOW, will talk about how you can submit programs and articles to magazines for fun and profit. He is also senior editor of PCM — and editorial director of SOFT SECTOR (for the Sanyo).

- **Dale Puckett** — **Beginner's Tour Of OS-9**
  Beginner's Tour of BASIC09

A free-lance writer and programmer, Dale has worked with microprocessors since 1976 and has just completed his first book, *The Official BASIC09 Tour Guide*. Dale will be available to sign copies of his book at RAINBOWfest.

- **Peter Stark** — **Advanced Operating Systems II**

Peter is a professor of electrical and computer engineering technology in the City University of New York and is president of Star-Kits Software Systems Corp.

- **Dan Downard** — **Machine Language For The Beginner**

Dan Downard is the technical editor for THE RAINBOW and an electrical engineer. He has been involved in electronics for 24 years through ham radio (K4KWT). His interest in computers began about five years ago and he has built several 68XX systems.

- **Paul Hoffman** — **Inside CoCo Graphics**

Paul Hoffman is an independent designer/-artist and Color Computer programmer. He is the author of Computerware's *Semi Draw* and a number of X-Pad programs.

- **Susan Davis** — **Women And Computers/Using Your Color Computer In Home Based Business**

Susan, co-owner of Sugar Software, will lead a panel discussion on women's involvement in the world of the Color Computer.

- **Steve Blyn** — **Computers In The Classroom**

Steve, an award-winning RAINBOW columnist and teacher, has written many educational programs for Computer Island.

- **Julie A. McGee**, director of software development for Tandy Home Education Systems, will be our keynote speaker at the CoCo Community Breakfast, Saturday morning at 8 a.m.

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Data tapes created by *Word Load* are interchangeable between the practice and testing programs. The *Grade List* program lists student grades recorded by *Spelling Test*. *AudioSpell* and *Word Load* were presented last month. This month we present and explain the functions of *Spelling Test* and *GradeList*.

The Audio Spelling System is designed to operate on the 16K Extended Color BASIC Radio Shack Color Computer with nothing more than a tape recorder and color television.

Routines are provided for the use of a line printer if it is available. Modifications are presented later in the article for modifying the programs for use on a level one BASIC CoCo.

Spelling Test

The materials needed are:

- Program Tape or Disk — Program Name *SpelTest*
- Spelling Words Tape (to be made using *Word Load*)
- Grades Tape
- Color Computer, television, and tape recorder
- Line printer or student-provided pencil and paper

Here are the instructions: *Spelling Test* is self-instructing, and works nearly identically to the *AudioSpell* program. If the student is familiar with operation of the Color Computer and loading programs from tape, he or she should be able to operate the program with no assistance. Otherwise, load and run the program for the student. Then place the Spelling Words tape in the recorder and push the play button. When the student completes the exam, a hard copy list of the exam will be printed for the student if you have a line printer. The exam listing will print the student's spelling of each word. When a word has been misspelled, an X is placed beside the word, and the correct spelling printed beside the incorrect word. The percentage score is printed at the top of the listing under the student's name. If a printer is not available, the student should be prepared to copy misspelled words from the screen. When the exam listing is completed, the student will be instructed to get the teacher. The keyboard will accept only the code word "KEYWORD" to continue the program. Insert the Grades tape into the tape recorder, type in "KEYWORD," ENTER, and follow the instructions for recording the student's grade to the Grades tape.

Grade List

The materials needed are:

- Program Tape or Disk - Program Name *GradList*
- Grades Tape or Data File on Disk
- Line Printer or Pencil and Paper

The instructions are: The *GradeList* program is self-instructing. If you have a printer, each student's grade will be printed for you. If you do not have a printer it will be necessary for you to copy each student's grades from the television screen.

Modification Of The Programs

It is good practice to make a copy of the program and store away the original program before making modifications. This allows you to fall back to the original program if something should happen to the copy while you are making the modifications.

Five seconds recording time was selected as optimum for the average user. This time can be easily modified to suit the individual teacher's needs. To change recording time, it is necessary to change only one value in each of three programs. The Color Computer requires one second to count to 460 in a *FOR... NEXT* loop such as the one found in Line 280 of the *Word Load* program. To change the length of time allowed to pronounce the word and use it in a sentence, you must multiply the number of seconds desired times 460 and place the resulting value in Line 280 of the *Word Load* program, Line 290 of the *AudioSpell* program, and Line 280 of the *Spelling Test* program in place of the value 2300. All three programs must contain the same value in the timing loop for the tapes to be read correctly.

Using Programs When No Printer Is Available

If you do not have access to a printer, you may want to eliminate the student input regarding the printer. If you have a printer and always intend to have misspelled words printed rather than displayed on the TV screen, you may wish to eliminate the choice of TV display. To eliminate choice of the printer, change the expression "Do you have a printer (yes or no)" in Line 360 of *Spelling Test* to "Press ENTER to continue," and eliminate everything after the variable A$ in Line 360. Next, eliminate program Lines 400 through 460. To eliminate the choice of printing the list to the TV, modify Line 360 exactly as

---

(Judy Dacus has a Ph.D. in curriculum and instruction and her specialties are curriculum development and science education. She is currently math, science, and computer science instructor for Mesilla Valley Christian Schools. Mike Dacus is an operations research analyst for The U.S. Army Training And Doctrine Command Systems Analysis Activity (TRASANA) at White Sands Missile Range, N.M. Both have a strong interest in computers in education.)

above, and eliminate program Lines 370 through 390.

Changing Printer Codes

The printing algorithms of these programs are written using ASCII codes for an Epson MX-80 printer. This printer uses *CHR$(14)* to print double width characters and *CHR$(10)* as a line feed command. If your printer does not use these two codes you must substitute your printer code for *CHR$(14)* in Lines 410,420, and 710 in *Spelling Test*, and Line 200 of *Grade List*, and substitute your printer's equivalent of *CHR$ (10)* in Lines 410, 420, and 710 of *Spelling Test*, and Line 200 of *Grade List*.

Modification To Run On A Non-Extended CoCo

As the programs are listed, they are for use on an Extended Color BASIC machine. To use these programs on a level one machine requires only removal or replacement of one reserved Extended word. The screens are formatted with the reserved word *STRING$*. This command prints a string of N copies of the ASCII character X as in *PRINT @ 0, STRING$ (N,X)*. To substitute for the *STRING$* command using level one BASIC you can substitute the algorithm

```
15 FOR I = 1 TO 32, : SC$ = SC$ +
CHR$(169): NEXT I
```

You will need one line and one variable for each different color band you wish to print. After you have set up the variable at the front of the program, you may then substitute the command — *PRINT SC$* — in place of each *PRINT STRING$* command in the program.

Explanation Of ASCII Symbol

In Line 110 of *SpellTest* the listing shows an underscore character in parentheses in the instructions to be printed to the screen. On the computer screen this shows as a left arrow, and is made by entering a shift-up arrow on the keyboard.

Disk Version Availability

We have developed versions of the spelling programs modified for the Disk Extended Color Computer. Using the system on disk will allow automated recording of grades in a grade file without teacher intervention. It will also expedite and facilitate student use of the spelling programs. For those who use disk systems, the authors will provide a copy of the complete set of programs for disk on a tape for $10. Our address is 206 Capri Road, Las Cruces, NM 88005. If you have problems with your entered version of these programs, be sure you have thoroughly proof-read your code before writing or calling. Please send a self-addressed stamped envelope with your request for help or you can call us at 505-524-3389. Please call between 5 and 10 p.m. Mountain Time.

100	243
200	237
360	200
500	98
660	19
END	238

Listing 1:

```
10 ' SPELLING EXAM
20 'COPYRIGHT 1982 BY JUDY M. AN
D DAVID M. DACUS, 206 CAPRI, LAS
 CRUCES, NM 88001
30 CLEAR 2000:NW = 50:DIM WRD$(N
W),W$(NW),N$(30),G$(30)
40 CLS:PRINT@0,STRING$(32,175);:
PRINT@42,"SPELLING EXAM"
50 PRINT@64,STRING$(32,175);"HI!
  MY NAME IS COCO THE COLOR  COM
PUTER.  CALL ME COCO.  THAT'SWHA
T ALL MY FRIENDS CALL ME."
60 PRINT@192,STRING$(32,175);:IN
PUT "WHAT IS YOUR NAME";NAM$
70 PRINT@256,STRING$(32,175);"TH
AT'S A NICE NAME - "NAM$".":PRIN
T@320,STRING$(32,175);
80 PRINT@352,"DO YOU KNOW HOW I
WORK? (TYPE NOAND I WILL TELL YO
U WHAT TO DO) PLEASE TYPE YES OR
 NO AND       PUSH <ENTER>"
90 INPUT A$:IF LEFT$(A$,1) = "Y"
 THEN 140
100 CLS:PRINT@0,STRING$(32,175);
"I WILL SAY THE WORD, I WILL USE
 THE WORD IN A SENTENCE, AND THE
NSAY THE WORD AGAIN.  WHEN I
 FINISH THE WORD I WILL ASK YOU
 TO SPELL IT.":PRINT@192,STRING$
(32,175);
110 PRINT"IF YOU MAKE A MISTAKE
USE THE   BACK ARROW (_) TO ERAS
E.":PRINT@288,STRING$(32,175);:I
NPUT"PUSH <ENTER> TO CONTINUE";A
$
120 CLS:PRINT@0,STRING$(32,175);
"WHEN YOU THINK YOU HAVE SPELLED
 THE WORD CORRECTLY,PRESS <ENTER
>.":PRINT@128,STRING$(32,175);
130 INPUT"PUSH <ENTER> TO CONTIN
UE";A$
140 CLS:PRINT@0,STRING$(32,175);
"NOW WE ARE READY TO START
 SPELLING THIS WEEK'S WORDS.":PR
INT@96,STRING$(32,175);
150 PRINT"PLEASE CHECK TO SEE TH
AT THE      TAPE MARKED - SPELLING
 WORDS -    IS IN THE TAPE RECORDE
R, THE      TAPE IS REWOUND, AND T
HE          RECORDER IS ON PLAY.":
PRINT@288,STRING$(32,175);
160 INPUT"WHEN YOU HAVE CHECKED
ALL THIS, PUSH MY <ENTER> BUTTON
 AND I'LL MOVE THE TAPE TO GET R
EADY.";A$:CLS:PRINTSTRING$(32,17
5);"I AM LOADING THE WORDS FROM
TAPE"
170 I = 0:W = 0:W$ = ""
180 OPEN"I", #-1,"WORDS"
190 IF EOF (-1) THEN 240
200 I = I + 1
210 INPUT #-1, W$
220 WRD$(I) = W$
230 GOTO 190
240 CLOSE #-1
```

```
250 NW = I
260 CLS:PRINT@0,STRING$(32,175);
:INPUT"WHEN YOU ARE READY FOR YO
UR      FIRST WORD PUSH MY <ENTER
>       BUTTON.";A$:CLS:PRINT@0,S
TRING$(224,175);"          LISTEN
CAREFULLY."
270 FOR I = 1 TO NW
280 AUDIO ON:MOTORON:FOR V = 1 T
O 2300:NEXT V:MOTOROFF:AUDIO OFF
290 SKIPF "MARKER":CLS:PRINT@0,S
TRING$(224,175);
300 INPUT"PLEASE SPELL THE WORD
YOU JUST  HEARD.";W$(I)
310 IF W$(I) = WRD$(I) THEN R =
R + 1 ELSE W = W + 1
320 PRINT@288,STRING$(32,175);:I
NPUT"READY FOR THE NEXT WORD";A$
:CLS:PRINT@0,STRING$(224,175);"
       LISTEN CAREFULLY"
330 NEXT I
340 CLS:AUDIO OFF:PRINT@0,STRING
$(32,175);"YOU ATTEMPTED TO SPEL
L           ";NW;" WORDS.":G = (R
/(W+R))*100
350 PRINT"YOU MISSPELLED ";W;" W
ORDS OUT OF ";W+R;" ATTEMPTS FOR
 A SCORE OF      ";G;"%."
360 PRINT@288,STRING$(32,175);:I
NPUT"DO YOU HAVE A PRINTER(YES O
R NO)";A$:IF LEFT$(A$,1) = "Y" T
HEN 400
370 CLS:PRINT "THESE ARE THE WOR
DS MISSED ":FOR I = 1 TO NW
380 IF W$(I) <> WRD$(I) THEN PRI
NT WRD$(I),:NEXT I ELSE NEXT I
390 PRINT:INPUT"WHEN YOU HAVE CO
PIED THESE WORDSON A PIECE OF PA
PER PUSH <ENTER>";A$:GOTO 470
400 CLS:PRINT@0,STRING$(224,175)
;"PRINTING SPELLING TEST"
410 PRINT#-2,CHR$(14);"SPELLING
TEST FOR ";NAM$;CHR$(10);CHR$(10
)
420 PRINT#-2,CHR$(14);"YOUR GRAD
E = ";G;"%";CHR$(10);CHR$(10)
430 PRINT#-2,"YOUR SPELLING", "M
ISSED","CORRECT SPELLING"
440 FOR I = 1 TO NW
450 PRINT#-2,I;".";W$(I),:IF W$(
I) <> WRD$(I) THEN PRINT#-2, "
 X",WRD$(I) ELSE PRINT#-2, ""
460 NEXT I
470 CLS:PRINT@0,STRING$(224,175)
;"GOOD LUCK WITH YOUR SPELLING.
  COME PRACTICE WITH ME FOR NEXT
  WEEK'S TEST."
```

```
480 PRINT@320,STRING$(32,246);:I
NPUT"PLEASE GET YOUR TEACHER";A$
490 IF A$ <> "KEYWORD" THEN 480
500 CLS:PRINT@0,STRING$(64,134);
"WE ARE NOW READY TO RECORD
 GRADES."
510 INPUT "IS THIS THE FIRST GRA
DE TO BE   RECORDED THIS WEEK";A
$
520 IF LEFT$(A$,1) = "Y" THEN X
= 1:N$(1) = NAM$:G$(1) = STR$(G)
:GOTO 730
530 CLS:PRINT@0,STRING$(64,134);
"BE SURE THAT THE - GRADES - TAP
EIS IN THE RECORDER, THE TAPE IS
 REWOUND, AND THE RECORDER IS ON
 PLAY."
540 INPUT"WHEN YOU ARE READY PUS
H <ENTER>";A$:CLS:PRINT@0,STRING
$(224,134);"LOADING GRADES."
550 I = 0:N$ = "":G$ = ""
560 OPEN "I", #-1, "GRADES"
570 IF EOF (-1) THEN 620
580 I = I + 1
590 INPUT #-1, N1$,G1$
600 N$(I) = N1$:G$(I) = G1$
610 GOTO 570
620 CLOSE #-1
630 N$(I+1) = NAM$:G$(I+1) = STR
$(G):X = I + 1
640 CLS:PRINT@0,STRING$(224,134)
;:INPUT"DO YOU WANT A LIST OF AL
L GRADES";A$
650 IF LEFT$(A$,1) <> "Y" THEN 7
30
660 INPUT"DO YOU WANT 1.CRT OR 2
.HARDCOPY LISTING";A:IF A = 2 TH
EN 700
670 CLS:PRINT"LIST OF GRADES"
680 FOR I = 1 TO X:PRINT N$(I),G
$(I):NEXT I
690 INPUT "PRESS <ENTER> TO CONT
INUE.";A$:GOTO 730
700 CLS:PRINT@0,STRING$(224,134)
;"PRINTING GRADES."
710 PRINT#-2, CHR$(14);"LIST OF
GRADES";CHR$(10);CHR$(10)
720 FOR I = 1 TO X:PRINT#-2, N$(
I),G$(I):NEXT I
730 CLS:PRINT@0,STRING$(64,134);
"NOW WE WILL RECORD GRADES TO
 TAPE.  REWIND THE TAPE,AND PUSH
 PLAY  AND RECORD."
740 INPUT"WHEN YOU ARE READY PUS
H <ENTER>.";A$
750 MOTORON:FOR V = 1 TO 2500:NE
XT V:MOTOROFF
```

```
760 OPEN "O", #-1, "GRADES"
770 FOR I = 1 TO X
780 N1$ = N$(I):G1$ = G$(I)
790 PRINT#-1, N1$,G1$
800 NEXT I
810 CLOSE #-1
820 CLS:PRINT@0,STRING$(224,169)
;"THE RECORDING OF GRADES IS
  FINISHED.":END
```

Listing 2:

```
10 REM THIS PROGRAM LISTS GRADES
 RECORDED BY THE SPELLING TEST P
ROGRAM
20 'COPYRIGHT 1982 BY JUDY M. AN
D DAVID M. DACUS, 206 CAPRI, LAS
 CRUCES, NM 88001
30 CLEAR 500:DIM N$(50),G$(50)
40 CLS:PRINT@0,STRING$(64,134);"
WE ARE NOW READY TO LIST GRADES.
"
50 PRINT@128,STRING$(32,134);"BE
 SURE THAT THE - GRADES - TAPEIS
 IN THE RECORDER, THE TAPE IS RE
WOUND, AND THE RECORDER IS ON PL
AY.":PRINT@288,STRING$(32,134);
60 INPUT"WHEN YOU ARE READY PUSH
 <ENTER>";A$:CLS:PRINT@0,STRING$
(224,134);"LOADING GRADES."
70 I = 0:N$ = "":G$ = ""
80 OPEN "I", #-1, "GRADES"
90 IF EOF (-1) THEN 140
100 I = I + 1
110 INPUT #-1, N1$,G1$
120 N$(I) = N1$:G$(I) = G1$
130 GOTO 90
140 CLOSE #-1
150 INPUT"DO YOU WANT 1.CRT OR 2
.HARDCOPY LISTING";A:IF A = 2 TH
EN 190
160 CLS:PRINT"LIST OF GRADES"
170 FOR X = 1 TO I:PRINT N$(X),G
$(X):NEXT X
180 INPUT "PRESS <ENTER> TO END
PROGRAM.";A$:GOTO 220
190 CLS:PRINT@0,STRING$(224,134)
;"PRINTING GRADES."
200 PRINT#-2, CHR$(14);"LIST OF
GRADES";CHR$(10);CHR$(10)
210 FOR X = 1 TO I:PRINT#-2, N$(
X),G$(X):NEXT X
220 END
```

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The Use Of Direct Access Disk Files

By Bill Nolan
Rainbow Contributing Editor

This article is the fourth in a series of six about using direct access disk files on the Color Computer. Specifically, we are looking at the use of these direct access disk files in database manager programs. A database manager is any program designed to keep track of some related pieces of information on a computer. In this tutorial series we have been learning about database manager programs and direct access disk files by looking at a particular type of database manager — a mailing list program. You will find that the principles we use to write a mailing list program can be easily applied to any other type of database manager program.

In working with database managers, we use the terms field, record, and file. In our mailing list program, the entire group of names, addresses, cities, states, ZIP codes, and phone numbers make up the file. All of the information about one person is a record, and each piece of information is a field.

When complete, the mailing list program will be a fairly nice one. It will search or sort on any field, and the sort method will be much faster than many commercial database programs. It will handle up to about 400 names.

The program listing with the article this month is the same as last month, and is part of the final program. This section will allow you to type in your information, store it on the disk, retrieve it, and print it on the screen or printer in several formats. We have been going over this program line by line, and last month we had covered about half of this listing.

> ***"A database manager is any program designed to keep track of some related pieces of information on a computer."***

This month we will cover the section concerned with printing out the data on the screen or printer, and the rest of the subroutines. Next month we will add the search section to the program, and the following month we will finish the program with the addition of the sort section.

The print section of the program starts at Line 4000, and you will want to refer to the listing while we go over it. Lines 4000 and 4010 clear the screen and print a menu on the screen. A menu is a list of choices, just like you get at a restaurant, and this menu has five choices. In order they are: Print on Screen; Print on Printer; Print on Labels; Print Phone Number List; and Return to the Main Menu. These are numbered from one to five, and the user is told (on the screen) to press one of those numerals. The *INKEY$* command at the end of Line 4010 is there to clear out the keyboard buffer. Line 4020 gets the user's response and checks it to see if it is really a number from one to five. If it is, Line 4030 goes to five different line numbers, depending upon which digit was pressed.

If users choose to print either on the screen or on labels, they will be sent to 4100. If they choose to print on the printer they will be sent to 4200. If they choose a phone number list, the program branches to 4300, and if they choose the main menu, the branch is to Line 500.

First let's suppose that they chose to print on the screen or labels. Line 4100 does a *GOSUB* to 5500 to open the file buffer to the disk, clears the screen, and

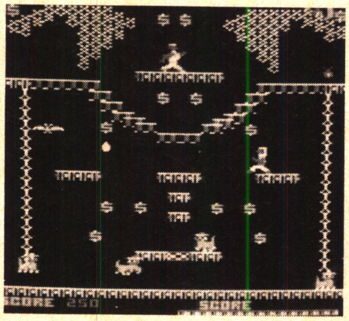
---

(Bill Nolan, who teaches "Programming In BASIC" at the college level, owns Prickly-Pear Software Co. and has written several commercially successful software packages.)

CASH MAN

By Bill Dunlevy & Doug Frayer

Exploding with color, racing with fast animation, and roaring with sound, this great non-violent game is destined to be a classic! The review in February's issue of RAINBOW says this: "A Fun Investment" "it is totally unique" "I found it very tough to tear myself away from playing the game long enough to write about it! In short, CASHMAN is one fun game. Buy it."



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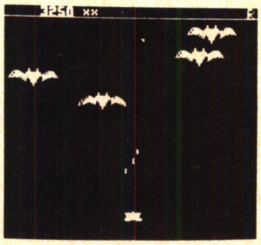
DEMON SEED

By Jeffery Sorenson
& Phillip MacKenzie

All alone in the silence of space, you switch on the view-port to look at the brilliant stars. And then you see THEM: a massive hoard of bat-like aliens, swarming towards you! The ship trembles under the distant explosions of enemy fire. You have only one chance for survival - Fight! As you attempt to defeat each new wave of enemy ships, they only get stronger and faster! If by some miracle you survive the first assault, you find yourself pitted against enemies so swift, powerful, and outright evil that only one name fits them - DEMONS! And if that's not enough, they bring out the heavy artillery - the Mother Ship! Engaging in battle, you see a dark cloud against the stars: another invasion fleet!



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By Bill Dunlevy & Harry Lafnear

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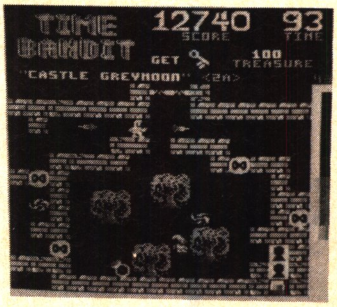

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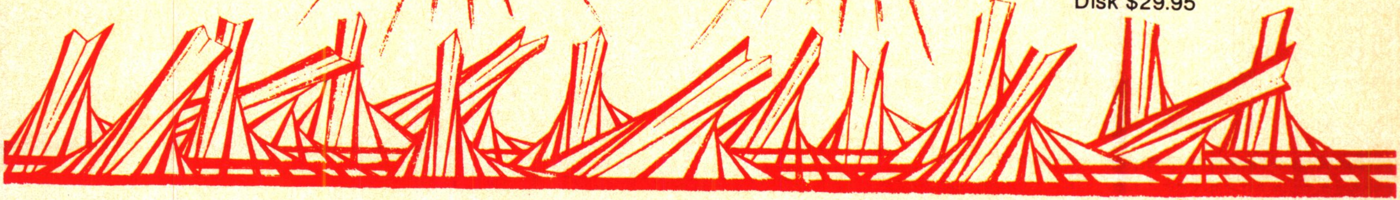

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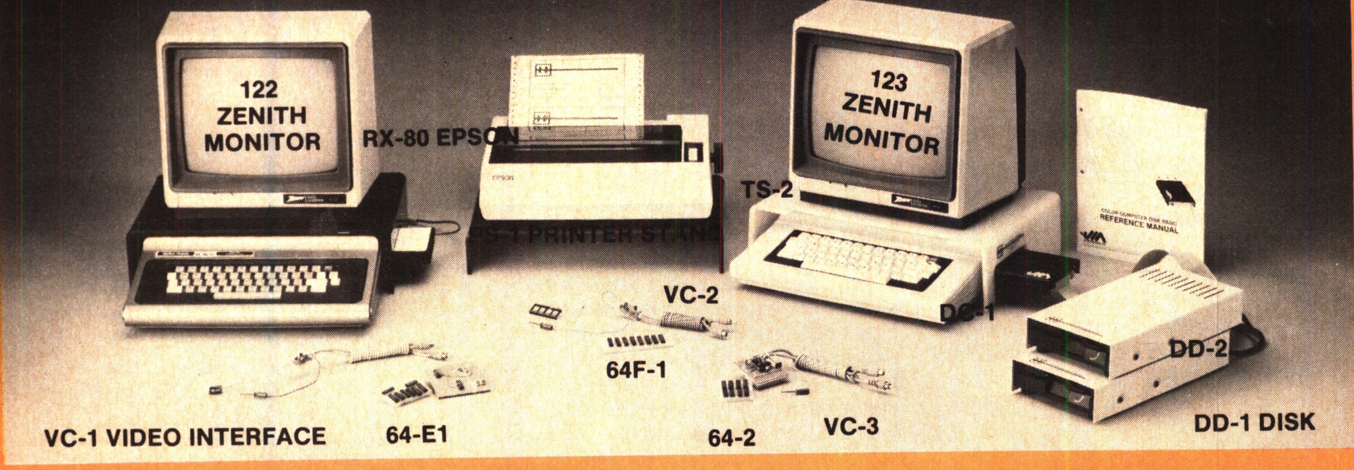

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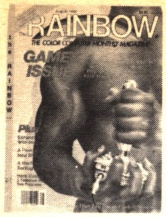

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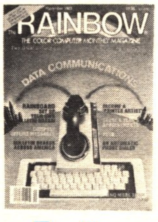

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prints a warning on the screen if the person has chosen to print on labels. Line 4110 sets up a loop based upon how many records are in the file, gets a record from the disk, and does a *GOSUB* to Line 7200 to put the information into an array. (Many of the subroutines have already been covered in previous installments of this series.)

Line 4120 checks the value of the variable PO to see whether the printing is to go to the screen or to labels, and branches to the subroutine at 5300 for the screen or 5000 for the labels. We will go over these in a moment. Line 4130 closes the loop that was opened in Line 4110, and Line 4140 closes the file buffer and returns to the printing menu at Line 4000. Here the user can choose another print option or return to the main menu.

The short subroutine at Line 5300 prints one record on the screen, does a *GOSUB* to 7000 to make the computer wait until a key is pressed, and then returns. The subroutine at 5000 is a bit more complex. First, set the variable FL to be equal to one. This is a flag that will be used by the search section of the program. Next, Line 5000 checks the value of the variable LC. This variable was set by users when they decide whether they wanted labels printed last name first or first name first. Remember, the names are entered and stored last name first to make alphabetizing easier, so if the user chose to have the labels printed first name first, it must be turned around.

If the user chose to have the label printed first name first, Line 5000 will do a *GOSUB* to 5100, and the subroutine that starts at 5100 and continues until 5150 will turn the name around (using the comma after the last name as a marker). Lines 5010 to 5040 are used to remove the extra spaces after the city name. (Remember, the fields are padded out with spaces so that a short city takes up the same disk space as a long city.) Once these string functions are completed the actual label is printed at Line 5050, while Line 5060 spaces down to the top of the next label. I am not explaining the string handling sections in detail because that is a subject that would require a few articles all to itself, and these are devoted (mostly) to disk file handling. Let me know if you want to hear about the string handling.

Going back to the menu choices in the print menu, so far we have covered choices one and three. If you choose number two (Print on Printer), you will be sent to 4200. Line 4200 does a *GOSUB* to Line 5500 to open the file buffer and prints a warning about the printer on the screen. Lines 4210 to 4230 are a loop that get all of the records from the file one at a time and print them on the printer. Line 4240 closes the file buffer and goes back to the print menu at 4000. The subroutine from 4300 to 4340 is almost the same as that at 4200, except that only the name and telephone number (menu option number 4) are printed on the printer.

That about covers the printing section of this program, and all of the other lines were covered in earlier articles in this series. Remember, next month we will add the section that conducts searches of the data, and we will go over it line by line as we have done here. The following month we will do the same for the sort portion of the program and also go over the methods you would use to customize the program. In the meantime you can be typing in your names and addresses. See you in November's issue.

560	100
1200	185
4210	37
5120	153
END	69

The listing:

```
10 CLS:GOTO 11000
20 CLEAR 15000
30 DIM ST$(400),ST(400),R$(6)
40 PRINT:PRINT" WORK ON WHICH FI
LE?":INPUT F$:GOSUB 5500:CLOSE #
1
50 IF LR<1 THEN PRINT:PRINT" THI
S IS A NEW FILE":PRINT:PLAY"AB":
GOSUB 7000
60 CLS:PRINT:PRINT"DO YOU WANT L
BELS PRINTED:":PRINT:PRINT" 1. L
AST NAME FIRST":PRINT" 2. FIRST
NAME FIRST":PRINT:PRINT"PLEASE S
ELECT 1 OR 2":K$=INKEY$
70 K$=INKEY$:LC=VAL(K$):IF LC<1
OR LC>2 THEN 70 ELSE SOUND 150,1
500 CLS
510 PRINT:PRINT"               MAIN
MENU":PRINT:PRINT"  1. ADD RECOR
DS"
520 PRINT:PRINT"  2. SORT RECORD
S"
530 PRINT:PRINT"  3. SEARCH RECO
RDS"
540 PRINT:PRINT"  4. PRINT RECOR
DS"
550 PRINT:PRINT"  5. END PROGRAM
"
560 PRINT:PRINT" PLEASE ENTER YO
UR CHOICE (1-5)":K$=INKEY$
570 K$=INKEY$:K=VAL(K$):IF K<1 O
R K>5 THEN 570 ELSE SOUND 150,1
580 ON K GOTO 1000,2000,3000,400
0,10000
1000 CLS:GOSUB 5500:CLOSE #1:CR=
LR+1:PRINT"  YOU ARE ADDING RECO
RD #";CR:PRINT"  TO THE FILE ";F
$
1010 PRINT:PRINT"NAME (LAST NAME
, FIRST NAME)?":LINE INPUT R$(1)
1020 PRINT:PRINT"ADDRESS?":LINE
INPUT R$(2)
1030 PRINT:INPUT"CITY?   ";R$(3)
1040 PRINT:INPUT"STATE CODE?   "
;R$(4)
1050 PRINT:INPUT"ZIP CODE?   ";R
$(5)
1060 PRINT:INPUT"PHONE #?   ";R$
(6)
1070 GOSUB 5500:GOSUB 7100:GOSUB
 7200
1080 CLS:FOR X=1 TO 6
1090 PRINT:PRINTR$(X)
1100 NEXT X
```

```
1110 PRINT:GOSUB 7020
1120 IF K$="Y" THEN 1200
1130 CLOSE #1:CLS:PRINT:PRINT" F
IELD TO CHANGE?":GOSUB 6500
1140 CLS:PRINT:PRINT" OLD DATA I
S:":PRINTR$(CF):PRINT:PRINT" ENT
ER NEW DATA:":LINE INPUT R$(CF):
GOTO 1070
1200 PUT #1,CR:CLOSE #1:CLS
1210 PRINT:PRINT" WANT TO ADD MO
RE? (Y/N)":K$=INKEY$:GOSUB 7030
1220 IF K$="Y" THEN 1000 ELSE 50
0
4000 CLS:PRINT:PRINT" PRINT ALL
RECORDS SECTION"
4010 PRINT:PRINT"  1. PRINT ON S
CREEN":PRINT"  2. PRINT ON PRINT
ER":PRINT"  3. PRINT ON LABELS":
PRINT"  4. PRINT PHONE # LIST":P
RINT"  5. RETURN TO MAIN MENU":P
RINT:PRINT"  PRESS A NUMBER (1-5
)":K$=INKEY$
4020 K$=INKEY$:PO=VAL(K$):IF PO<
1 OR PO>5 THEN 4020 ELSE SOUND 1
50,1
4030 ON PO GOTO 4100,4200,4100,4
300,500
4100 GOSUB 5500:CLS:IF PO=3 THEN
 PLAY "CDEF":PRINT" MAKE SURE PR
INTER AND LABELS    ARE SET UP A
ND ON LINE":GOSUB 7050
4110 FOR X=1 TO LR:GET #1,X:GOSU
B 7200
4120 IF PO=1 THEN GOSUB 5300 ELS
E GOSUB 5000
4130 NEXT X
4140 CLOSE #1:GOTO 4000
4200 GOSUB 5500:PLAY"CDEF":PRINT
" MAKE SURE PRINTER IS ON LINE":
GOSUB 7050
4210 FOR X=1 TO LR:GET #1,X:GOSU
B 7200
4220 PRINT#-2,R$(1);"   ";R$(2):P
RINT#-2,R$(3);"   ";R$(4);"   ";R$
(5);"   ";R$(6):PRINT#-2,""
4230 NEXT X
4240 CLOSE #1:GOTO 4000
4300 GOSUB 5500:PLAY"CDEF":PRINT
" MAKE SURE PRINTER IS ON LINE":
GOSUB 7050
4310 FOR X=1 TO LR:GET #1,X:GOSU
B 7200
4320 PRINT#-2,R$(1);"    ";R$(6)
4330 NEXT X
4340 CLOSE #1:GOTO 4000
5000 FL=1:IF LC=2 THEN GOSUB 510
0
5010 FOR Y=LEN(R$(3)) TO 1 STEP
-1
5020 IF MID$(R$(3),Y,1)<>" " THE
N 5040
5030 NEXT Y
5040 R$(3)=LEFT$(R$(3),Y)
5050 PRINT#-2,R$(1):PRINT#-2,R$(
2):PRINT#-2,R$(3);",  ";R$(4);"
 ";R$(5)
5060 FOR Y=1 TO 3:PRINT#-2,"":NE
XT Y:RETURN
5100 P=INSTR(1,R$(1),","):IF P=0
 THEN RETURN
5110 N1$=RIGHT$(R$(1),30-(P+1)):
N2$=LEFT$(R$(1),P-1)
5120 FOR Y=LEN(N1$) TO 1 STEP -1
5130 IF MID$(N1$,Y,1)<>" " THEN
5150
5140 NEXT Y
5150 N1$=LEFT$(N1$,Y):R$(1)=N1$+
" "+N2$:RETURN
5300 CLS:PRINT:PRINT"  RECORD #"
;X:PRINT:FOR Y=1 TO 6:PRINTR$(Y)
:NEXT Y:PRINT:GOSUB 7000:RETURN
5400 FL=1:FOR Y=1 TO 6:PRINT R$(
Y):NEXT Y:PRINT:RETURN
5500 OPEN"D",#1,F$,99
5510 FIELD #1,30 AS N$,30 AS A$,
15 AS C$,2 AS S$,9 AS Z$,13 AS P
$
5520 LR=LOF(1):RETURN
6500 PRINT:PRINT" 1. NAME":PRINT
" 2. ADDRESS":PRINT" 3. CITY":PR
INT" 4. STATE":PRINT" 5. ZIP COD
E":PRINT" 6. PHONE #":PRINT
6510 PRINT" PRESS A NUMBER (1-6)
":K$=INKEY$
6520 K$=INKEY$:CF=VAL(K$):IF CF<
1 OR CF>6 THEN 6520 ELSE SOUND 1
50,1:RETURN
7000 K$=INKEY$:PRINT"   PRESS AN
Y KEY TO CONTINUE"
7010 IF INKEY$="" THEN 7010 ELSE
 SOUND 150,1:RETURN
7020 PRINT" IS THIS CORRECT? (Y/
N)":K$=INKEY$
7030 K$=INKEY$:IF K$<>"Y" AND K$
<>"N" THEN 7030 ELSE SOUND 150,1
:RETURN
7050 FOR X=1 TO 2000:NEXT X:RETU
RN
7100 LSET N$=R$(1):LSET A$=R$(2)
:LSET C$=R$(3):LSET S$=R$(4):LSE
T Z$=R$(5):LSET P$=R$(6):RETURN
7200 R$(1)=N$:R$(2)=A$:R$(3)=C$:
R$(4)=S$:R$(5)=Z$:R$(6)=P$:RETUR
N
10000 CLS:UNLOAD:END
11000 PCLEAR1:GOTO 20
```

16K
ECB

The third in a five-part series on . . .

Everything
You Always
Wanted To Know
About The Color Computer
But Radio Shack Didn't Tell You

By Andy Kluck

Here's part three of my semi-monumental, almost noteworthy assemblage of CoCo trivia. This installment features a demonstration of how a little known feature of the *GET* and *PUT* statements can be used to speed up animation.

Tape Files and *PRINT*

According to the April '82 issue of Radio Shack's newsletter, ". . .the only difference in creating/maintaining disk files as opposed to tape files is the device you specify when you open the buffer." While this may be true on the machine language level, there is an important difference in the way *PRINT* works with different device numbers. When *PRINT* is used with device number -2, zero, or one to 15 for a disk file, items in the list followed by a semicolon are printed with nothing following, and items followed by a comma are followed by the necessary number of spaces to fill up the comma field. If there is no comma or semicolon at the end of the list, a carriage return is printed; this complies with standard BASIC's definition of *PRINT*. However, for device -1, the cassette file, a carriage return is printed after each item in the list, whether it is followed by a semicolon or a comma. Therefore, *PRINT* only works the same with cassette files and disk files when there is only one item printed in each statement, and the statement does not end with a comma or semicolon. By printing a carriage return after each item, BASIC's designers were able to insure that a file made by:

```
PRINT#-1,A$,B
```

Would be properly retrieved by:

```
INPUT#-1,A$,B
```

Disk BASIC solves this same problem differently — by including the *WRITE* statement, which places quotation marks around strings and commas between items. It also provides a more comprehensive version of INPUT which is used only with disk files.

DLOADM

The Extended BASIC manual's summary lists a *DLOADM* statement that "Loads a machine language program." Actually there are both a *DLOAD* for loading BASIC programs and a *DLOADM* for loading machine language over the RS-232 port using a special protocol; however, *DLOADM* doesn't work in Extended BASIC 1.0 without the Disk ROM because of a bug.

EDIT

Besides the editing functions given in

(Andy Kluck is an electrical engineering student at the University of Texas at Austin.)

the manual, three other commands are available:

A — Cancel changes and edit the same line again
Q — Cancel changes and quit
E — Same as ENTER

PMODE and *SCREEN*

According to the Extended BASIC manual's summary, *PMODE* "Selects resolution and memory page to start on." Actually, *PMODE* selects which starting page and mode are used for plotting statements (*PSET, CIRCLE, DRAW, PCLS*, etc.) and the *PPOINT* function, but it does not adjust which pages are visible even if *SCREEN 1,1* has been executed. This feature is useful in displaying one picture while drawing the next: *PMODE 3,5: SCREEN 1,0: PMODE 3,1* causes drawing on pages one to four but leaves pages five to eight on the screen. Also, something like: *PMODE 4,1: SCREEN 1,1: PMODE 3,1* will display in *PMODE 4* but draw in *PMODE 3*. Because the picture element size in *PMODE 4* is one half the interval of one period of the color TV chroma signal, alternating light and dark bits produce "artifact colors." Pictures drawn in *PMODE3* and displayed in *PMODE 4, SCREEN 1,1* have four distinct colors:

Color Number	Resulting Color
1 or 5	Black
2 or 6	Red or Blue-green
3 or 7	Blue-green or Red
4 or 8	White

> *"Because the picture element size in* PMODE4 *is one half the interval of one period of the color TV chroma signal, alternating light and dark bits produce 'artifact colors.' Pictures drawn in* PMODE3 *and displayed in* PMODE4, SCREEN 1,1 *have four distinct colors . . ."*

The red and blue-green colors tend to reverse randomly when Reset is pressed. *PMODE4* in *SCREEN 1.0* also produces these colors, but they are usually washed out by the green tint. Incidentally, graphics generally don't work in the second 16K of the piggy-backed memory expansion, but this shouldn't be a problem unless you do something like *FILES 2,14000*.

Saving pictures on tape or disk

To save the picture set-up in the last *PMODE* statement on tape, try:

```
CSAVEM "filename", PEEK(&HBA)
*256, PEEK(&HB7)*256-1, &HB44A
```

or on disk,

```
SAVEM "filename/PIC", PEEK
(&HBA)*256, PEEK(&HB7)*256-1,
&HB44A
```

Loading pictures back gets a little more complicated, since the location of the graphics pages is moved around depending on whether or not Disk BASIC is in the system, and the values in the last *FILES* statement. For pictures saved on disk, if you always use the standard *FILES* setting and only save pictures starting from the first graphics page, it should always be safe to simply:

```
LOADM "filename/PIC"
```

Before saving or loading a disk pic-

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ture by this method, have the program test location *$BA* to make sure it contains *14 ($0E)* and stop the save or load if it doesn't, since this indicates either *FILES* has been used or *PMODE* did not specify page one as the start page. With cassette pictures, the address of the screen can't always be made the same. If a picture is both saved and loaded on a system without Disk BASIC, it should be sufficient to set *PMODE* the same as is was when the picture was saved and *CLOADM* the file. In programs written to be compatible with Disk BASIC, cassette pictures should be loaded in such a way that the start address on the tape is ignored, and the correct address of graphics page one is used instead, using a subroutine like:

```
10000 POKE&H78,0'MARK CAS-
SETTE FILE CLOSED
10010 POKE&H1D1,0'INDICATE
MATCH ANY FILENAME
10020 EXEC&HA648'READ FILE
HEADER
10030 POKE&H1E7,PEEK(&HBC):
POKE &H1E8,0 ' SET LOAD AD-
DRESS TO START OF PAGE 1
10040 EXEC &HA505 ' FINISH
CLOADM
10050 RETURN
```

When loading a picture from either cassette or disk, there should be at least four pages *PCLEARed* so if the file happens to be from *PMODE3* or *4* (6K long), it won't run over onto the BASIC program.

DRAW and *PLAY*

Radio Shack's decsriptions of *DRAW* and *PLAY* leave out any mention of Extended BASIC's special feature for using numeric variables instead of constants in their strings. Suppose you wanted to set *DRAW's* angle and scale values according to variables and draw a line of variable length up from the cursor. Using the techniques given in the manual, you would have to create a string with the correct numbers inserted:

```
DRAW "A"+STR$(X)+"S"+STR$
(Y)+"U"+STR$(Z)
```

However, recently somebody discovered that an equals sign, a variable name, and a mandatory semicolon may be substituted anywhere a numerical constant is expected in a *DRAW* or *PLAY* string. Using this convention, the above line becomes:

```
DRAW "A=X;S=Y;U=Z;"
```

This is also useful in *PLAY*; for example, if 'N' has been set to a legal note value number (1-12), the instruction *PLAY* "=N;" will produce the note. Incidentally, the Extended BASIC manual states that the option 'B' should always precede the 'M' command in *DRAW* strings. In fact, the 'M' command without 'B' is the only way to specify a line to be drawn at any nonstandard angle.

GET and *PUT*

Although you would probably never guess it from reading the Extended BASIC manual, *GET* and *PUT* can be used in two completely different modes of operation. I will refer to these as the Exact mode and the Speed mode. Exact mode is best for small images, when speed is not important, or where a logical operation is needed; it is specified by using one of the five options with *PUT* or the *,G* suffix with *GET*. Note that the *,G* actually only specifies which mode to use; it does not affect the "graphic detail" or resolution of the image. The manual says options shouldn't be used in *PMODEs 0, 1*, or *3*, but I have found nothing to support this as long as the programmer recognizes that use of any option other than *PSET* in a four-color

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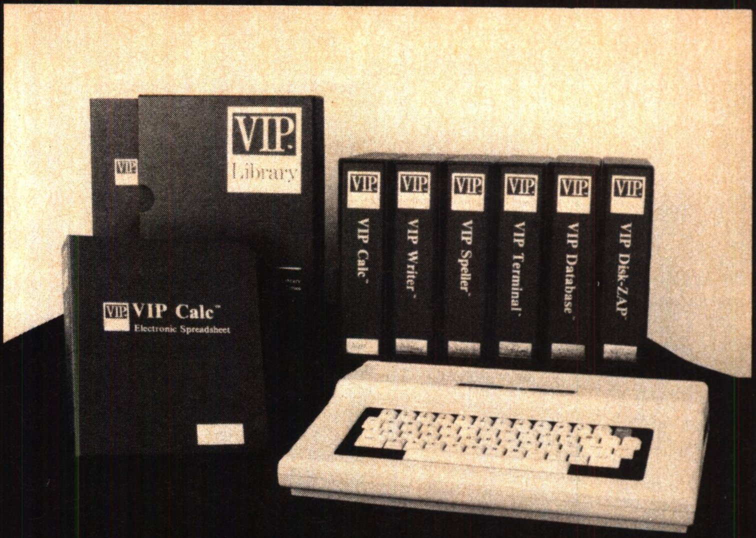
VIP™ Library



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The Library Concept

State of the Art, Quality, Integrity, Compatibility and Affordability. Five things good software must possess. Five things that epitomize the **VIP Library™**. Each program is the diamond of its class, true excellence. These programs are first in features, first in power, first in memory, and all are affordably priced.

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All **Library** programs are written in machine code specifically for the Color Computer, to work without the interference of a separate operating system such as FLEX. From this comes speed and more workspace for you. Unlike other programs for the Color Computer which are said to be 64K compatible, **VIP Library™** programs are not limited to between 24 and 30K of workspace in 64K. **Library** programs have Memory Sense with BANK SWITCHING to fully use all 64K, thus giving up to 51K with a disk version and up to 53K with a tape version.

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Each **Library** program was carefully designed to be extremely easy to use. Built-in on-screen help tables are at your fingertips, as are menus of all kinds. Every effort is made to use logical, intuitive and easy-to-remember commands. The manuals have been thoughtfully prepared to cover every aspect of the program, and they have complete tutorials to get you going right away. We set the standard!

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State-of-the-Art graphics allow instant use of four display colors, and eight lowercase displays featuring descending lowercase letters. You can select from 51, 64 or 85 columns by 21 or 24 lines per screen, with wide or narrow characters in the 64 display. These screens provide a pleasant and relaxing way to perform your tasks, with as much text on the screen as is possible. Each program is easy to learn and a joy to use. We take pride in the stringent testing done to make these programs perform flawlessly. Every feature, every convenience, sleek, simple and elegant.

> *". . . PICTURE getting your instantaneous investment report over the phone, using it in your spreadsheet calculation, generating a report, and writing a memo including that report and data from your database with your word processor, and all this with VIP Library™ programs . . ."*

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The Library Programs

For your writing needs is the **VIP Writer™**, and its spelling checker, the **VIP Speller™**. For financial planning and mathematical calculations you can use the **VIP Calc™**. To manage your information and send multiple mailings there is the **VIP Database™**. For sending all these files to and from home or the office and for talking to your friends you can have the **VIP Terminal™**. Finally, to fix disks to keep all your **Library** files in good repair we offer the **VIP Disk-ZAP™**.

Mini Disk Operating System

The Disk versions each have a Mini Disk Operating System which will masterfully handle from 1 to 4 drives. It offers smooth operation for such features as the ability to read a directory, display free space on the disk, kill files, save and automatically verify files, and load, rename and append files. **Library** programs simply do not have the limitations of BASIC.

Professionalism

Each volume of the **Library** is beautifully bound in a cloth-bound, gold embossed binder, and comes with a matching slipcase to protect your investment.

The **Library** will grace your work area with the professionalism it deserves. Welcome the **VIP Library™** into your home and office.

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VIP Writer

Includes VIP Speller at no additional cost!!

By Tim Nelson

RATED TOPS IN RAINBOW, HOT COCO, COLOR COMPUTER MAGAZINE & COMPUTER USER

The most powerful and easy-to-use word processor is available in the showpiece and workhorse of the **Library: The VIP Writer™**. Because of its undisputed superiority over all Color Computer word processors, it was selected by Dragon Data Ltd. of England and TANO in the U.S., to be the Official Word Processor for their line of Dragon microcomputers.

The result of two years of research, the **VIP Writer™** offers every feature you could desire from a word processor. It is the most powerful, fastest, most dependable and most versatile. With the hi-res display, workspace and compatibility features built into the **Library** the **Writer** is also the most usable.

". . . Nearly every feature and option possible to implement on the Color Computer. The design of the program is excellent; the programming is flawless." October 1983 "Rainbow"

"Among word processors for the CoCo, VIP Writer stands alone as the most versatile, most professional program available." May 1984 "Computer User"

"Word processing with VIP Writer is like driving a high-performance vehicle . . . This Ferarri of a package has more features than Telewriter, Easywriter (for the IBM PC), or Applewriter." October 1983 "Hot CoCo"

The **Writer** will work with you and your printer to do things you always wanted to do. Every feature of your printer can be put to use, every character set, every graphics capability at any baud rate, EVEN PROPORTIONAL SPACING. All this with simplicity and elegance. You can even automatically print multiple copies.

Although all versions feature tape save and load, the disk version provides the Mini Disk Operating System common to the whole **Library**, plus disk file linking for continous printing.

Professional features of particular note:

- Memory-Sense with **BANK SWITCHING** to fully utilize 64K, giving not just 24 or 30K, but up to 53K of workspace with the tape version and 50K with the disk version.
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- A TRUE EDITING WINDOW in all 9 display modes for those extra wide reports and graphs (up to 240 columns!).
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Radio Shack Catalog No. 90-0141

32K (Comes with tape & disk) $69.95

VIP Writer — VIP Speller Combo comes in VIP Writer Binder.

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By Bill Argyros

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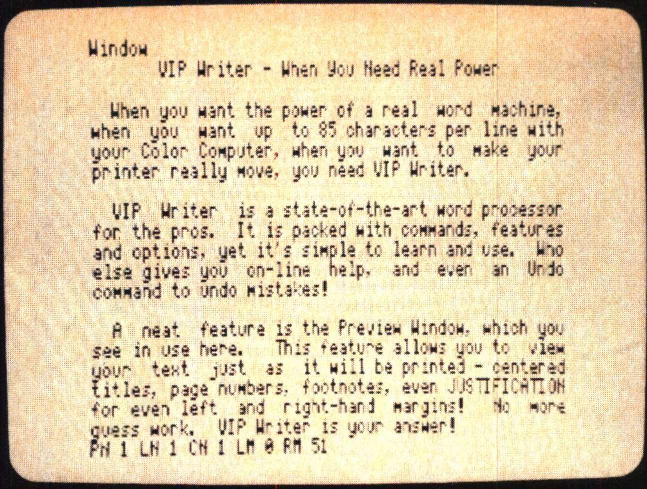
Radio Shack Catalog No. 90-0142

32K DISK ONLY $49.95

Lowercase displays not available with this program.



```
Window
      VIP Writer - When You Need Real Power

  When you want the power of a real  word  machine,
when  you  want  up  to 85 characters per line with
your Color Computer, when you  want  to  make  your
printer really move, you need VIP Writer.

  VIP  Writer  is a state-of-the-art word processor
for the pros.  It is packed with commands, features
and options, yet it's simple to learn and use.  Who
else gives you  on-line  help,  and  even  an  Undo
command to undo mistakes!

  A  neat  feature is the Preview Window, which you
see in use here.   This feature allows you to  view
your  text  just  as  it will be printed - centered
titles, page numbers, footnotes, even JUSTIFICATION
for even left  and  right-hand  margins!   No  more
guess work.  VIP Writer is your answer!
PN 1 LN 1 CN 1 LM 0 RM 51
```

VIP Calc™

By Kevin Herrboldt

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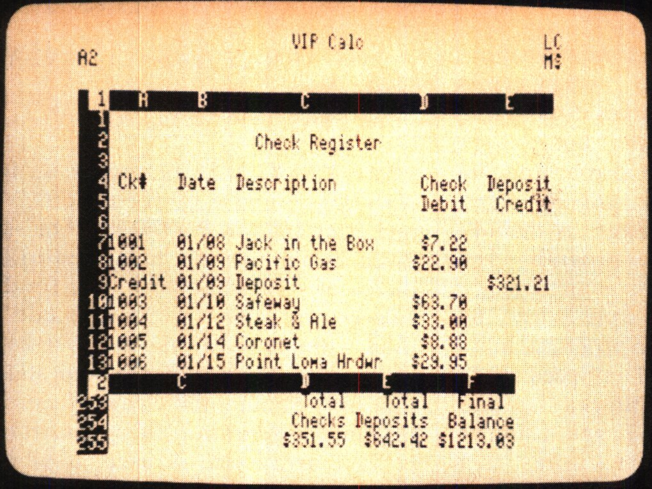
Radio Shack Catalog No. 90-0143

32K (Comes with tape & disk) $69.95

32K does not have hi-res displays, sort or edit.



```
                        VIP Calc                           LC
A2                                                         M$

 1  A      B           C              D        E
 1
 2                 Check Register
 3
 4 Ck#    Date  Description         Check   Deposit
 5                                  Debit    Credit
 6
 71001   01/08 Jack in the Box      $7.22
 81002   01/09 Pacific Gas         $22.90
 9Credit 01/09 Deposit                      $321.21
101003   01/10 Safeway             $63.70
111004   01/12 Steak & Ale         $33.00
121005   01/14 Coronet              $8.88
131006   01/15 Point Loma Hrdwr    $29.95
 2             C          D         E         F
253                     Total     Total     Final
254                    Checks  Deposits   Balance
255                   $351.55   $642.42  $1213.03
```

VIP Terminal™

RATED BEST IN JANUARY 1984 "RAINBOW"

By Dan Nelson

From your home or office you can join the communication revolution. The **VIP Terminal™** opens the world to you. You can monitor your investments with the Dow Jones Information Service, or broaden your horizons with The Source of CompuServe, bulletin boards, other computers, even the mainframe at work.

For your important communication needs you've got to go beyond software that only lets you chat. You need a smart termnal so that you can send and receive programs, messages, even other **VIP Library™** files. **VIP Terminal™** has "more features than communications software for CP/M, IBM and CP/M 86 computers." Herb Friedman, Radio Electronics, February 1984.

FEATURES: Choice of 8 hi-res lowercase diplays * Memory-Sense with BANK SWITCHING for full use of workspace * Selectively print data at baud rates from 110 to 9600 * Full 128 character ASCII keyboard * Automatic graphic mode * Word mode (word wrap) for unbroken words * Send and receive **Library** files, Machine Language & BASIC programs * Set communications baud rate from 110 to 9600, Duplex: Half/Full/Echo, Word length: 7 or 8, Parity: Odd/Even or None, Stop Bits: 1-9 * Local linefeeds to screen * Save and load ASCII files, Machine Code & BASIC programs * Lowercase masking * 10 Keystroke Multiplier (MACRO) buffers to perform repetitive pre-entry log-on tasks and send short messages * Programmable prompt or delay for send next line * Selectable character trapping * Send up to ten short messages (KSMs), each up to 255 characters long, automatically, to save money when calling long distance.

All versions allow tape load and save of files and KSMs, but the disk version also has the Mini Disk Operating System.

Radio Shack Catalog No. 90-0139

32K (Comes with tape & disk) $49.95

(Tape comes in 16K but without hi-res displays)

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VIP Database™

"ONE OF THE BEST" JULY 1984 "RAINBOW"

By Tim Nelson

This high speed MACHINE LANGUAGE program fills all your information management needs, be they for your business or home. And it does so better than any other database program for the Color Computer, featuring machine code, lowercase screens and mailmerge capabilities. Inventory, accounts, mailing lists, family histories, you name it, the **VIP Database™** will keep track of all your data, and it will merge **VIP Writer™** files.

The **VIP Database™** features the **Library** Memory Sense with BANK SWITCHING and selectable lowercase displays for maximum utility. It will handle as many records as fit on your disk or disks. It is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design. All files are fully indexed for speed and efficiency. Full sort of records is provided for easy listing of names, figures, addresses, etc., in ascending or descending alphabetic or numeric order. Records can be searched for specific entries, using multiple search criteria. With database form merge you may also combine files, sort and print mailing lists, print "boiler plate" documents, address envelopes - the list is endless. The math package even performs arithmetic operations and updates other fields. Create files compatible with the **VIP Writer™** and **VIP Terminal™**. Unlimited print format and report generation with the ability to imbed control codes for use with all printers.

As with all other **Library** programs, the **Database** features the powerful Mini Disk Operating System.

Radio Shack Catalog No. 90-0140

32K DISK $59.95

64K Required for math package & mail merge

VIP Disk-ZAP™

RAVED ABOUT IN THE APRIL 1983 "RAINBOW!"

By Tim Nelson

Your database file disk, form letter disk, or BASIC program disk goes bad. An I/O error stops loading, or even backing up of the disk. Weeks, even months of work sit on the disk, irretrievable. Now catastrophic disk errors are repairable, quickly and with confidence, using the **VIP Disk-ZAP™**. It is the ultimate repair utility for simple and quick repair of all disk errors. Designed with the non-programmer in mind, the **VIP Disk-ZAP™** will let you retrieve all types of bashed files, BASIC and Machine Code programs.

This high-speed machine code disk utility has a special dual cursor screen display to look at the data on your disk. You are able to: Verify or modify disk sectors at will * Type right onto the disk to change unwanted program names or prompts * Send sector contents to the printer * Search the entire disk for any grouping of characters * Copy sectors * Backup tracks or entire disks * Repair directory tracks and smashed disks * Full prompting to help you every step of the way * 50-plus page Operators Manual which teaches disk structure and repair.

Radio Shack Catalog No. 90-0144

16K DISK $49.95

Lowercase displays not available with this program.

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PMODE can cause predictable color changes; for example, using *PRESET* to *PUT* an image or not over an area containing an image inverts each bit of the color code, causing colors one and four and colors two and three to reverse. Speed mode is specified by omitting either the *,G* in *GET* or option in *PUT* after the array name. Instead of using the exact rectangle specified in the statement, the Speed mode widens the rectangle so that only entire bytes are affected, and the operation is done a byte at a time. To prevent confusion regarding how big a rectangle is really used, I recommend using only rectangles that already contain only complete bytes so that enlargement will not occur. Specifically, the rectangle's smaller X-coordinate should be an integer multiple of eight for *PMODEs 1, 3*, and *4* or 16 for *PMODEs 0* or *2*, and the greater should be one less than such a multiple. If this condition is observed in all *GETs* and *PUTs* done in Speed mode, arrays made in the two modes are compatible; otherwise images made in one mode may be scrambled by *PUT* in the other. This restriction points out the main disadvantage of the Speed mode — there are only 32 discrete horizontal positions (16 in *PMODES 0* and *2*) where arrays can be placed. This makes it most suitable for vertical motion, but smooth horizontal motion can also be done by making four separate, slightly offset arrays of the same image, as demonstrated in the sample program. The speed advantage of this mode depends largely on how much time is used by other statements in the program; however, a full screen *PUT* in Speed mode has been clocked at 11 times as fast as a *PUT* with option *PSET*, and a similar *GET* runs about six times as fast as a *GET* with *,G*. This should be useful for those who work with high-speed animation, although it might have been more useful if it had been correctly described two years ago in the instruction manual. The manual also says that the array must be dimensioned with one element for each screen position; this seems a waste considering that a picture element is just one or two bits, and an array element is five bytes. Actually, the arrays are used much more efficiently than this, and a two-dimensional array is not necessary. I suggest this formula for determining the size of a sufficient array:

DIM ARRAY ((X2-X1+1)*(Y2-Y1+1)/N)
GET (X1,Y1)-(X2,Y2),ARRAY,G

where *X2>X1, Y2>Y1*, and *N=40* for *PMODEs 3* and *4*, 80 for *PMODEs 1* and *2*, or 160 for *PMODE 0*. The size given by the formula may need to be increased somewhat to make up for the enlargement effect if Speed mode is used without following the even-byte convention. Notice that the book states that only about 1400 elements can be read into an array in a 16K system. If the correct array size is used, a whole *PMODE 4* picture will fit in an array that uses about 6K of memory.

Sample Program

This program does an animation sequence twice, first using *PUT* in exact mode, then in Speed mode. Even with the extra overhead involved in selecting which array to use, the animation runs about three times as fast in Speed mode. Note how the routine at 270 calculates even-byte coordinates for *PUT* in Speed mode and selects one of the four arrays for smooth motion; also, Hex constants are used for added speed.

200 37
END 195

The listing:

```
10 GOTO 330
20 GOTO 40
30 CLEAR 200:PCLEAR 4:GOTO 20
40 DIM A1(33),A2(33),A3(33),A4(3
3)
50 FOR N=0 TO 1
60 PMODE 4,1:PCLS0:SCREEN1,1:PMO
DE 3,1
70 CIRCLE(38,10),26,4,.3
80 PAINT(38,10),3,4
90 GET(8,0)-(71,20),A1
100 GET(6,0)-(69,20),A2,G
110 GET(4,0)-(67,20),A3,G
120 GET(2,0)-(65,20),A4,G
130 PCLS1
140 X=10
150 TIMER=0
160 FOR Y=171 TO 92 STEP -2
170 GOSUB 260
180 NEXT
190 FOR X=10 TO 190 STEP 2
200 Y=Y-.5
210 GOSUB 260
220 NEXT
230 PRINT"SAUCER TOOK OFF IN";TI
MER/60;"SECONDS."
240 NEXT N
250 END
260 IF N=0 THEN PUT(X,Y)-(X+&H3F
,Y+&H14), A1,PSET:RETURN
270 Z=X AND &HFE
280 ON (Z AND &H7)/&H2 GOTO 300,
310,320
290 PUT(Z,Y)-(Z+&H3F,Y+&H14),A1:
RETURN
300 PUT(Z-&H2,Y)-(Z+&H3D,Y+&H14)
,A2:RETURN
310 PUT(Z-&H4,Y)-(Z+&H3B,Y+&H14)
,A3:RETURN
320 PUT(Z-&H6,Y)-(Z+&H39,Y+&H14)
,A4:RETURN
330 PMODE 0,1:PCLEAR 1:GOTO 30
```

Take Stock Of Your Portfolio with Pro-Color-File

BY JORGE MIR

A natural use of home computers is record keeping or electronic filing. As a result, I developed a program called *UNIDATFL*, short for Universal Data File. The original version appeared in the February 1982 issue of THE RAINBOW and later on was enhanced and renamed *DATAFILE*. I still use it quite often for simple record keeping, "to do" lists, reminders, etc. It is more like a note pad than a database system.

Well, a few years have gone by since I bought my computer and now the professionals have had a chance to develop

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some very fine, sophisticated software for us.

One of these professionals is Dennis Derringer of Derringer Software who has developed the *Pro-Color-File* database system for us. This is a powerful system which allows you to design your own databases, custom tailored to your needs without the need to develop any programs. The system does it all for you.

I have developed several *Pro-Color-File* applications, including the typical checkbook and name and address files which are always useful in the home. In addition, I have also developed other more sophisticated applications such as a stock portfolio system; a financial statement ratio analysis system that develops statistics on companies and, through various report formats, prepares comparison reports of competitors, customers, etc.; a travel and entertainment reporting system for business applications, plus others.

The rest of this article is devoted to an explanation of the stock portfolio system. This application covers many of the powerful features of *Pro-Color-File* and I thought it might be of interest to THE RAINBOW readers.

Each record in the stock portfolio system contains a total of 146 characters stored within 23 different fields. These fields are stored in two different segments and are accessible through three different screens for viewing or updating. In addition, the system performs 13 calculations on each record, and data can be selected and printed or shown on the monitor screen through six different report formats.

Before going any further, an explanation of the various terms used in the previous paragraph is advisable.

The length of each record that *Pro-Color-File* can handle is limited to 1,020 characters. That is, up to 1,020 bytes can be stored per record. A record is made up of fields (up to a maximum of 60) which the user defines indicating the title of each field as well as the length (number of bytes) to be stored in each field. Because of the Color Computer limitations, a 1,020 byte record cannot be processed unless it is broken down into 255 byte sections. *Pro-Color-File* refers to these sections as segments. Thus, each segment can contain up to 15 different fields with a total of up to 255 bytes each (4 * 255 = 1,020). The stock portfolio system stores data in two different segments. The first segment contains 15 fields and uses a total of 89 bytes. The second segment contains eight fields and uses a total of 57 bytes. This brings us to the total of 23 fields and 146 bytes included in each record as noted above.

(Jorge Mir is a certified public accountant and is currently controller of a "Fortune 500" company. He publishes most of his original work on the CoCo through THE RAINBOW.*)*

At this time, you should refer to the illustration of these segments under "Field Definitions" so you can see the various fields used in the stock protfolio system.

The most important part of an efficient and effective database system is the record format. Before you design each segment, you must determine what type of data is to be stored in each record and how you are going to manipulate and report it. For example, one of the requirements in the portfolio system is to sort data by date. Rather than storing the date fields in the familiar format of month-day-year, it is more efficient to store the date in year-month-day format so it can be properly sorted first by year, then month, then day.

Also keep in mind that if the data is not contained in the record, it cannot be reported. This may sound too elementary to even mention it, but you will be surprised how often I have designed databases and left out an important field which I subsequently needed. For example, after I designed the portfolio system, I found a need to report on stocks which had been held over a certain number of months but I had failed to include this piece of data in each record. When referring to the field definition illustrations, this might explain why the "months owned" appears as the last field in each record rather than after the date fields.

Most of the fields in each record are self-explanatory and simply require that

FIELD DEFINITIONS

```
FILENAME: STOCKS**
DEFINED DATA FOR SEGMENT - 1
------------------------------------------
FIELD : HEADING                     LENGTH
------------------------------------------
 1. -- PUR YEAR                          2
 2. -- PUR MONTH                         2
 3. -- PUR DAY                           2
 4. -- SALE YEAR                         2
 5. -- SALE MONTH                        2
 6. -- SALE DAY                          2
 7. -- CO. NAME                         24
 8. -- TYPE OF SEC                       4
 9. -- PUR AMOUNT                       10
10. -- # OF SHARES                       6
11. -- PER SHARE                         6
12. -- SALE AMOUNT                      10
13. -- PER SHARE                         6
14. -- STATUS                            1
15. -- GAIN/LOSS                        10
------------------------------------------
Total data space = 89
This segment is stored on Drive 0
```

```
FILENAME: STOCKS**
DEFINED DATA FOR SEGMENT - 2
FIELD : HEADING                     LENGTH
------------------------------------------
16. -- FMV/SHARE                         6
17. -- TOTAL FMV                        10
18. -- UNR. G/L                         10
19. -- CUR DIV RATE                      6
20. -- ANNUAL DIV                       10
21. -- FMV YIELD                         6
22. -- INV YIELD                         6
23. -- MONTHS OWNED                      3
------------------------------------------
Total data space = 57
This segment is stored on Drive 0
```

data be inputted by the user. *Pro-Color-File* provides us with the ability to make calculations as each record is entered, thus avoiding the need to enter such results manually. For example, the stock portfolio system contains various fields which the system automatically includes in each record such as (field number is included in parenthesis): cost per share (11), proceeds per share (13), gain or loss on sale (15), total fair market value of shares (17), unrealized gain or loss (18), dividend yield based on market value (21), dividend yield based on invested amount (22) and, finally, the last-minute-added months owned (23).

One key field is the "status" field. This field is used to indicate whether the stock was sold or is still owned. If this field contains a '1', the stock was sold, otherwise, the field contains a blank space. This is necessary since I wanted the system to calculate a gain or a loss if the stock was sold, but no such calculation if it was still owned.

Let's look at the calculations being performed in the stock portfolio system (refer to the "equations" illustration).

EQUATIONS

```
FIELD
   NO. = EQUATION

1.  11 = 09/10 % SHARE AMT
2.  13 = 12/10 % SHARE AMT
3.  13 = 13*14 % SHOW IF SOLD
4.  15 = 12-9  % SALE AMT — PUR AMT
5.  15 = 15*14 % GAIN OR LOSS
6.  17 = 16*10 % CALCULATE TOTAL FMV
7.  18 = 17-09 % UNREALIZED GAIN/LOSS
8.  20 = 10*19 % ANNUAL DIVIDENDS
9.  21 = 20/17 % CURRENT DIV YIELD
10. 22 = 20/09 % INVESTMET DIV YIELD
11. 30 = 04-01 ! YEARS OWNED
12. 30 = 30*"12" ! EQUIVALENT MONTHS
13. 23 = 05-02+30 ! MONTHS OWNED
```

The first two calculations develop the purchase and sale amounts per share. The third calculation shows the sale amount per share if the stock has been sold or shows a zero if it is still owned. Since the status field contains a blank until the stock is sold, the sale amount per share would develop a zero (anything times zero returns a zero). On the other hand, if the status field contains a '1' (meaning the stock was sold), the per share amount is multiplied times one and entered as such in the field. This same technique is used to develop the gain or loss on sale (calculation number five).

Three calculations were used to develop the number of months owned. First, the system calculates the number of years owned (calculation 11) and then converts this number to months (calculation 12) which when added to the difference between the month fields (calculation 13) results in number of months elapsed from the purchase date to the current date (more on the use of these dates later).

Let's look at the equations a little closer. You will notice that each is followed by two different characters ('%' or '!'). The '%' is used when you want the calculation to return a number followed by a decimal point and two digits to the right of the decimal which is the format used for dollars and cents or ratios. The '!' is used when you want the result to be in whole numbers. If no symbols are used, then the result will not be adjusted. You will also note equation 12 contains the number 12 in quotes. This tells the system to take whatever is in field 30 and multiply it times 12 (rather than field number 12) in this particular instance. You might ask how can I use field number 30 when it has not been defined at all. Remember, there are only 23 fields contained in each record. Well, *Pro-Color-File* allows us to use fields temporarily without having to define or store them. In this instance I used field 30 to perform some calculations to get ready for the final calculation (number 13) where I store the number of months owned in field 23.

Pro-Color-File allows a total of 28 calculations which can be performed on each record as it is entered.

Unlike other database systems I own, *Pro-Color-File* allows you to design your own fill-in-the-blanks forms for entering data which are also used for viewing or updating records. The system refers to these blank forms as screens and you can have up to four of these screens.

The system allows you to use any of the colors offered by the Color Computer as your screen background or for coloring any section of your screen. I chose a black background with prompts in lower case so that characters are shown green on a black background. When you are defining screens, the system uses a screen editing routine so that you can place data anywhere on the screen. Several editing functions are also included in the system so that you can add lines, delete lines, etc., with ease.

You will notice that after, or underneath, every prompt there is a left bracket along with a number. This indicates the beginning of the data field along with the corresponding data field number. These data field numbers correspond to the fields previously defined under each of the two segments used. Between the brackets and the field numbers there are certain characters. A '#' indicates that it is alphanumeric (both characters and numbers); a '.' indicates that the data is a number followed by a decimal point plus two characters to the right of the decimal; and a '!' indicates that the field data is to be shown on the screen but cannot be modified from the keyboard.

On Screen number one, all of the data is to be entered except for the per share purchased cost (line that starts with a 'p'), per share sales price (line that starts with an 's') and the gain or loss sale, all of which will be calculated by the system as data is entered.

On Screen number two, most of the data is either calculated by the system or has been previously entered except for the current fair market value of the shares and the date (mm, dd, and yy). Please note that the date contained in fields four, five and six serve a dual purpose. If the shares have been sold, the date of sale is entered in these fields (Screen number one); if the shares have not been sold, these fields can be used to indicate the date the current fair market value is entered (Screen number two).

On Screen number three, all of the data fields have been previously entered or calculated by the system except for the current dividend rate.

SCREEN DEFINITIONS

SCREEN NUMBER 1

```
co name [$7

   type [$8

number of shares [#10
   mo      da      yr      each       amount

P  [#2     [#3     [#1     [!11       $[.9

s  [#5     [#6     [#4     [!13        [.12
                                   ------------

total gain or loss                 $[!15

status   [#14
```

SCREEN NUMBER 3

```
co name [!7

   type [!8

  shares [!10       div  [.19

annual dividends    [!20

                              yield
current fmv        [!17       [!21

 investment        [!9        [!22
```

SCREEN NUMBER 2

```
co name [$7

   type [$8    shares  [!10

mm      dd      yy      months      fmv

[#5     [#6     [#4     [!23        [.16

current value                 $[!17

amount invested               $[!9
                             -----------
gain or loss                  $[!18
```

So, three screens are used, each showing some common or unique data for that screen. One shows the current status of the transaction, the next one shows unrealized gains or losses and the third one shows the dividend yield data along with applicable data to make the screens meaningful as you review or enter the data.

Now comes the fun and power of the *Pro-Color-File* system: the reporting capabilities.

The system allows you to design and store up to eight different report formats. These can either be reports to be printed or simply shown on the monitor screen.

The stock portfolio system uses six different report formats. The first five generate hard copy reports while the last one shows the data on the monitor screen.

Report numbers one, three, four and five are designed for obtaining data on stocks currently owned while report numbers two and six are designed for obtaining data on stocks sold.

Before you obtain data using the various report formats, you need to properly arrange it and sort it. For example, reports one through five require that records be sorted by company name while report number six requires records to be sorted by year.

By selecting the appropriate report format and carefully selecting the sorted data, you can obtain numerous types of reports for various purposes. The system allows an ample variety of selection procedures for reporting purposes such as selecting all records or only those records which meet or do not meet certain criteria.

For example, using report format number one, you can select and print all of the stocks which are still owned, by selecting those records with a blank in the status field. You can further limit the items to be selected by indicating those for which a current fair market value has been entered, or those showing unrealized gains, or unrealized losses. You can even select those with number fields equaling, exceeding or falling below selected amounts, or dates, etc.

It is beyond the scope of this tutorial to cover all of the possible types of selections that could be made to produce specific type reports since the selection criteria that could be used is so flexible and encompassing. Even the comprehensive manual supplied with the *Pro-Color-File* system cannot begin to cover the various possibilities available to the user in selecting and reporting data.

Let's look into the report formats a little closer. First of all, you are allowed up to three lines for the titles and two lines for the column headings. Also, two additional title lines can be inserted at the time you are printing a report thus further allowing individual identification of reported data based on the selection procedure followed.

Your reports can contain any number up to 255 characters per line and, based on the printer capabilities, such data can be printed in single or multiple line formats per record. Pages can also be numbered automatically as the report is being printed.

Looking at report format number one, you will notice that there are 96 characters per line and a total of seven columns are printed out along with the appropriate column headings as noted. Just below each column heading, indicate whether the data is to be printed as alphanumeric (using '%') or as numeric only (using '#') using the same format as the 'print using' statement in BASIC. Underneath each of the field indicators, there is the familiar left bracket and field number so the system knows which data field to print.

REPORT FORMATS

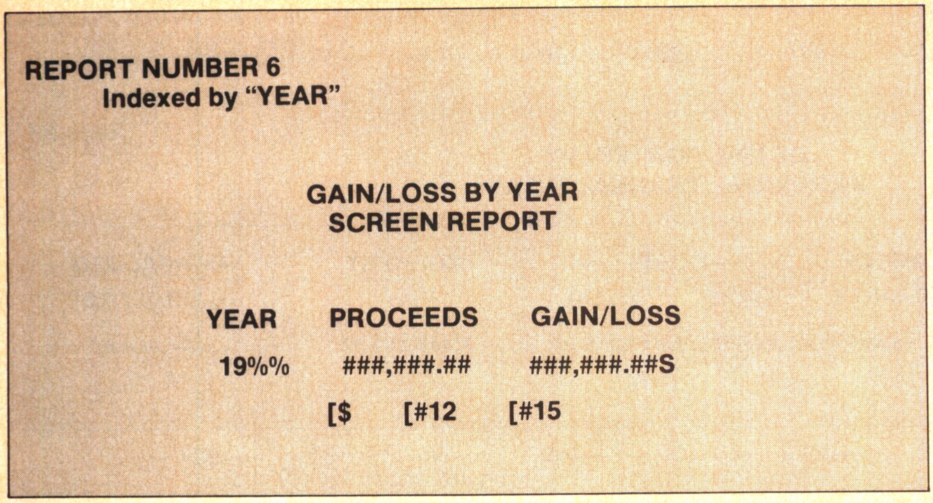
```
----+----10---+----20---+----30---+----40---+--><50---+----60---+----70---+----80---+----90---+-
REPORT NUMBER 1
     Indexed by "COMPANY NAME"                                                          Page ##
                                   DETAIL PORTFOLIO
                                INDIVIDUAL TRANSACTIONS
-----------------------------------------------------------------------------------------------
                      | SEC  | NO. OF | --------COST--------  |    CURRENT     |  UNREALIZED  |
COMPANY NAME          | TYPE | SHARES |  EACH       TOTAL     |      FMV       |  GAIN/(LOSS) |
%                   % | % %  | ##,### | ###.## #,###,###.##   | #,###,###.##   |  #,##,###.## |
[$7                     [$8    [#10     [#11   [=9              [=17              [=18
```

```
----+----10---+----20---+----30---+----40---+--><50---+----60---+----70---+----80---+----90---+-
REPORT NUMBER 2
     Indexed by "COMPANY NAME"                                                          Page ##
                                  SALE OF SECURITIES
                             GAINS/LOSSES BY TRANSACTION
-----------------------------------------------------------------------------------------------
                 |      | PURCHASED   |    SOLD     | MOS. | PROCEEDS   | ORIGINAL   | GAIN OR    |
COMPANY NAME     | SHRS | MO  DA  YR  | MO  DA  YR  | HELD | FROM SALE  |   COST     |  (LOSS)    |
%              % | #,###| %%-%%-%%    | %%-%%-%%    | #### | ###,###.## | ###,###.## | ###,###.##|/
[$7                [#10   [$2[$3[$1     [$5[$6[$4     [#23   [=12         [=9          [=15
```

```
----+----10---+----20---+----30---+----40---+--><50---+----60---+----70---+----80---+----90---+-
REPORT NUMBER 3
     Indexed by "COMPANY NAME"                                                          Page ##
                                   DETAIL PORTFOLIO
                        UNREALIZED GAINS/LOSSES BY TRANSACTION
-----------------------------------------------------------------------------------------------
                      |       | PURCHASED  | CUR DATE    MOS. | CURRENT    | ORIGINAL   | GAIN OR    |
COMPANY NAME          | SHRS  | MO  DA  YR | MO  DA  YR | HELD | FMV        |   COST     |  (LOSS)    |
%                   % | #,### | %%-%%-%%   | %%-%%-%%   | #### | ###,###.## | ###,###.## | ###,###.##|/
[$7                     [#10    [$2[$3[$1    [$5[$6[$4    [#23   [=17         [=9          [=18
```

```
----+----10---+----20---+----30---+----40---+--><50---+----60---+----70---+----80---+----90---+-
REPORT NUMBER 4
     Indexed by "COMPANY NAME"                                                          Page ##
                                   DETAIL PORTFOLIO
                         DIVIDEND YIELD OF INDIVIDUAL INVESTMENTS
-----------------------------------------------------------------------------------------------
                          | NUMBER OF | ORIGINAL   | CURRENT    | ANNUAL     | ------YIELD------
COMPANY NAME              |  SHARES   |   COST     |   FMV      | DIVIDENDS  |  COST    FMV   I
%                       % |  ###,###  | ###,###.## | ###,###.## | ###,###.## |  ##.##   ##.## I/
[$7                          [#10       [=9          [=17         [=20          [#22     [#21
```

```
----+----10---+----20---+----30---+----><---+----50---+----60---+----70---+-----
REPORT NUMBER 5
     Indexed by "COMPANY NAME"                                                          Page ##
                                   DETAIL PORTFOLIO
                                  SUMMARY BY COMPANY
-----------------------------------------------------------------------------------------------
                                     |   TOTAL    |  NO. OF  | ------STOCK  PRICES------    |
COMPANY NAME                         | INVESTMENT |  SHARES  |  LOW   |  HIGH  |  AVERAGE   |
     %                             % | ###,###.## | ###,###  | ###.## | ###.## |   ###.## S
[$                                     [=9          [=10       [L11     [H11       [@11
```



```
REPORT NUMBER 6
      Indexed by "YEAR"


                         GAIN/LOSS BY YEAR
                           SCREEN REPORT


             YEAR      PROCEEDS       GAIN/LOSS

              19%%      ###,###.##     ###,###.##S

                     [$     [#12     [#15
```

At this point, you have further choices in determining how data is to be printed by using different characters between the left brackets and the field numbers. For example, a '$' is used to indicate the data is to be printed as alphanumeric data, '#' indicates numeric data, '=' indicates numeric data plus totals to be printed at the end of the report. You can also use '@' to indicate you want the average of a numeric field to be printed, 'L' for the lowest value or 'H' for the highest value (more on this later). You can even print out numeric data as if it were alphanumeric data, such as printing the dates so that hyphens can be placed between the year, month and day.

One powerful reporting feature is that of summary reports. For example, let's assume you have purchased shares of various companies at various times and at various prices. By sorting the records by company name and using report format number five, you can obtain a summary listing by company (a single line printed for all records of the same company) showing the total amount invested, number of shares owned as well as the lowest, highest and average price of the shares owned. Likewise, if the records are sorted by year, you can obtain a summary of gains or losses by year using report format number six. Summary reports are obtained by placing an 'S' at the end of the data line as shown on report numbers five and six.

One very helpful feature of the report writer contained in the *Pro-Color-File* system is that you are not impaired by the fact that the Color Computer only allows 32 characters of data to be displayed on the screen at any one time. Using a special window effect, you are shown the entire report as if it were a worksheet right on the screen. You can actually scroll from left to right to view an entire report even though it might be 255 characters per line. This feature is extremely useful in designing your reports with unequalled ease as compared to other systems.

Since special printer codes can be selected for lines to be printed, *Pro-Color-File* can work with any of the popular printers used with the Color Computer, plus most of the printers converted to work with it.

I have been using *Pro-Color-File* ever since it was first introduced and can safely describe it as one of the most powerful database systems I have thus far encountered for use with the Color Computer. In fact, I like it so well that I have formed a National User Group devoted to it whereby members can exchange information concerning the system along with enhancements, modifications, description of systems in use and even exchange databases created with the system. Although the group was recently formed, we currently have almost 100 members as of the date of this writing and continue to grow rapidly.

You can obtain further information on this powerful database system by contacting Derringer Software directly or writing to our *Pro-Color-File* National User Group, 12851 W. Balboa Drive, New Berlin, WI 53151.

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16K ECB

If At First You Don't Succeed . . . Read The Directions!

By Steve Blyn
Rainbow Contributing Editor

Are you the type who gets a new software utility, loads it in, and then promptly declares that it doesn't work? Or are you the type who reads the directions first? Too many of us are the first type. We have been wrongly trained in this 'Age of Marvels' to expect things to work automatically. Much to our dismay, sometimes they don't work that easily.

Children often follow in the footsteps of their parents. My children too often expect software packages to operate automatically. They reflect the shortcomings of the adults around them. Learning to read and follow directions are skills that we need to stress in the elementary grades and on through the higher grades.

A careless approach to new material is not restricted by any means to software. The same person who overlooks software directions will also overlook directions in a variety of other areas. New household items and appliances are frequent examples. Did you ever try to assemble a backyard swing set without reading the directions?

(Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He and his wife, Cheryl, own Computer Island.)

A child who does not read or listen to directions carefully in school can often receive a grade lower than his true abilities. Sometimes directions indicate certain ways of entering answers so they are not overlooked by the scorer. A careful reading of the directions would indicate this. Other times, children who don't read directions may respond incorrectly, fully believing that they are correct. An example of this would be giving synonyms when antonyms were asked for, or some other unintentional mistake.

Children are especially prone to overlooking directions on many of the standardized tests given to them. These tests can greatly affect decisions on the class placement of the child. Realizing the problem, many times teachers are instructed to read the directions aloud to the children while they read them to themselves before the test begins.

One exercise I have always found successful in classes is utilized in this month's article. A sheet of paper is distributed to each child. There are either nine numbers or letters printed on the sheet in Tic-Tac-Toe fashion. The point is to follow the leader's directions involving these numbers or letters. The directions may either be printed on the back of the sheet of paper, or read to the children by the leader.

The leader may either be the teacher, or another student. Of course, parents could do this at home to reinforce the skill. Also, the exercise is worthwhile and at the same time entertaining for a parent and an impatient child waiting in a doctor's office, or an airport, as a non-computer activity. This exercise works equally well for oral or written directions.

1. Read this entire paper first
2. Draw a box around C
3. Draw a box around G
4. Draw a line from C to G
5. Draw a triangle around W
6. Draw a figure 8 around B and S
7. Draw a circle around M
8. Draw a #4 between the letters K and A

The first time that you try this exercise on a youngster, it is a good idea to add the additional written instruction,

9. Do not write anything on this paper.

You will be surprised how many youngsters will not get to the last instruction until they have done all of the

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instructions. It is a learned habit for many of us to ignore instruction one and plunge headlong into the task.

This 'trick' will, of course, only work the first time on any individual, but it should serve to drive home the point.

Our program draws the nine letters and the geometric shapes needed to complete the directions. Line 40 tells the computer to *GOSUB 300*. Lines 300 to 380 contain the drawings for the nine letters needed for the exercise. Line 390 draws a number 4 which we also need. Line 400 *RETURN* back to Line 50.

Lines 80 through 160 draw the nine letters on the screen in Tic-Tac-Toe fashion. Lines 170 through 180 wait for you to press the ENTER key. *(CHR$(13)* represents the ENTER key). When it is pressed, the program proceeds. Lines 190 through 250 draw the completed diagram with the instructions carried out. Pressing ENTER again will repeat the procedure.

This program will enable the child or class to view the results of the instruction set on the computer screen. They can easily compare it to their own paper to check for accuracy. The program could, perhaps, be used as a pretest and retest for before and after some of your teaching on the topic of improving the reading of directions.

It is an easy job to create other similar worksheets for the children to practice on. The directions are given by you on a separate sheet of paper or are read aloud by you. The only program changes would be on Lines 190 through 250.

It is both fun and good practice in learning about CoCo graphics to figure out the drawing of the various graphics around the letters. Perhaps some of your children could assist in creating some of these additional graphics. Either their ideas or their actual programming assistance could be encouraged.

The need to follow directions is just as important for teachers as for their students. We should all be careful to search the directions of our software purchases. Often there is an important first or last instruction that may tell us to make a backup copy to protect the original master disk. Another overlooked instruction may be to enter a password before beginning the program. We really can't guess what all of the essential instructions are until we carefully read the directions ourselves.

210...... 252
END 82

The listing:

```
10 REM"FOLLOWING DIRECTIONS"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,NY,1984
30 PCLS:SCREEN1,0:PMODE3,1:CIRCL
E(50,50),10
40 CLS:GOSUB300
```

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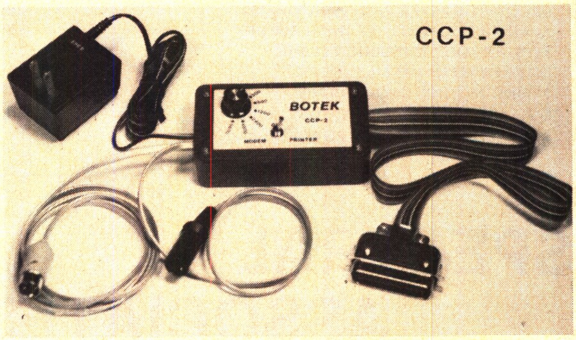

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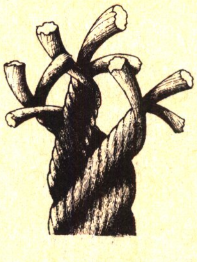

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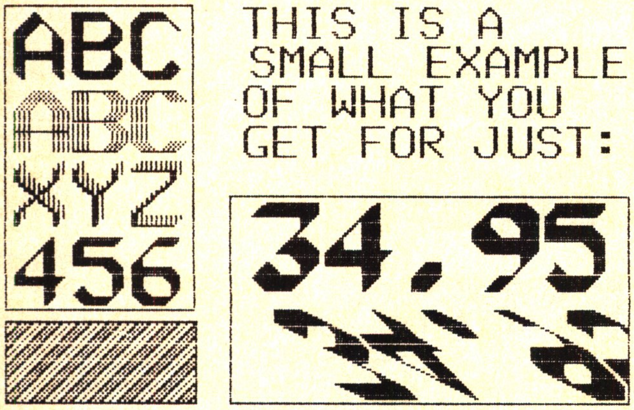
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```
50 PCLS:PMODE3,1:SCREEN1,1
60 COLOR6:LINE(15,20)-(240,170),
PSET,B
70 PAINT(1,1),7,6
80 DRAW"S12;C8;BM50,50"+K$
90 DRAW"BM110,50"+G$
100 DRAW"BM170,50"+M$
110 DRAW"BM50,100"+A$
120 DRAW"BM110,100"+B$
130 DRAW"BM170,100"+S$
140 DRAW"BM50,150"+C$
150 DRAW"BM110,150"+Y$
160 DRAW"BM170,150"+W$
170 EN$=INKEY$
180 IF EN$=CHR$(13) THEN 190 ELS
E 170
190 COLOR6:LINE(40,130)-(70,155)
,PSET,B:REM"A BOX AROUND C
200 LINE(100,60)-(130,30),PSET,B
:REM"A BOX AROUND G
210 LINE(100,60)-(70,130),PSET:R
EM"A LINE FROM C TO G"
220 LINE(175,120)-(150,160),PSET
:LINE-(200,160),PSET:LINE-(175,1
20),PSET:REM"A TRIANGLE AROUND W
"
230 CIRCLE(125,90),30,6,.5:CIRCL
E(180,90),30,6,.5:REM"A FIGURE 8
 AROUND B AND S"
240 CIRCLE(178,45),20:REM"A CIRC
LE AROUND M
250 DRAW"S8;BM50,75"+FR$:REM" A
4 BETWEEN K AND A"
260 EN$=INKEY$
270 IF EN$=CHR$(13) THEN RUN ELS
E 260
280 GOTO 280
290 REM"HERE ARE THE LETTERS USE
D IN THE PROGRAM"
300 A$="BU4R3FDHL2GDFR2ENU2FBR2"
310 B$="BU6RD6NLBUFR2EU2HL2GBF3B
R3"
320 C$="BRNR2HU2ER2FBD2GBR3"
330 G$="BRNR2HU2ER2FNUD2NGD2GL2H
BEBR5"
340 K$="RU6NLBD4R2NE2F2BR2"
350 M$="BU4FND3EFND3EFD3BR2"
360 S$="BUFR2EHL2HER2FBD3BR2"
370 W$="BUNU3FENU3FENU3BR2BD"
380 Y$="BUNU3FR2ENU3D2GL2HBUBR6"
390 FR$="BR3U5G3R4BD2BR3"
400 RETURN
```

GRAPHICS UTILITY

32K ECB

For *PMODE 4* Screen Enlargement, There's . . .

Blowup

By Joseph Kohn

The graphics capability of the CoCo continues to be an essential and useful tool. The ability to create and manipulate graphics has been the subject of many articles and much software. The *BLOWUP* program described here should be a useful adjunct to most of these for the purpose of enlarging portions of the *PMODE 4* screen.

The program allows the user to load the *PMODE 4* screen from either disk or tape. Then by using the right joystick, a portion of this "source" screen can be selected for "blowing up," or enlarging. The enlarging ratio is 2 to 1, vertically and horizontally. The section of the source screen selected is 128 pixels wide by 96 pixels high, which is the size of one-quarter of the *PMODE 4* screen. Pressing the fire button will enlarge this section to a full screen.

The resulting blowup can be examined or copied to the source screen, where it can be saved to tape or disk, or enlarged again. This provides for interfacing *BLOWUP* to other graphics programs such as a screen printer or *Graphicom*, and allows repeated enlargements which can create some unusual effects.

The *BLOWUP* program is shown in Listing 1. The program is menu-oriented and contains the necessary instructions. The only additional note is that when viewing a graphics screen, pressing any key will return to the menu. Several safeguards are provided so that the user has the option of aborting an operation and returning to the menu.

BLOWUP uses all eight graphics pages. The source screen resides on pages one to five. The blowup is generated on pages five to eight. By using eight pages, the source screen is preserved and can be examined at any time. The source screen will only be destroyed by the *COPY BLOWUP* command, which copies the blowup screen to the source screen. The *PCLEAR 8* statement in Line 40 sets up the graphics pages. If the program does not run as written, enter *PCLEAR 8* before loading and running *BLOWUP*.

The BASIC program is quite straightforward, and requires little explanation, except for the graphics cursor routine and embedded machine language (ML) subroutine. The program structure, by lines, is:

40-50	Initialize
60-80	ML subroutine
90-120	Main menu
130-180	Load source
190-240	Save source
250-260	Blowup instructions
270-340	Graphics cursor
350-360	Call to ML subroutine
370	See source
380	See blowup
390-400	Copy blowup
410-420	Utilities

(Joseph Kohn is a systems engineer for TRW in San Bernardino, Calif. He is currently president of the Citrus Color Computer Club. His interests are graphics and utilities.)

The program adapts automatically to use of disk or tape for determining where the graphics reside. Remember that page one starts at *$600* without disk and *$E00* with disk. This information is conveniently stored at *$BA*, which is the most significant byte (MSB) of the start of the page selected by the *PMODE* command.

The sequence of generating the graphics cursor begins by establishing the start address of page one. This is accomplished by SB in Line 270. The joystick inputs are weighted and then added to SB. The address AD is the location of the upper left (UL) cursor byte. This address is offset by 3055 bytes for the lower right (LR) cursor byte.

To provide a non-destructive cursor that is visible regardless of screen content, the value in the UL and LR bytes is first *PEEKed*. The same bytes are *POKEd* with their numerical complement (Line 300). The original values are finally restored in Line 320.

The cycle of reading the joysticks and blinking the cursor is repeated if neither the fire button (Line 340) or space bar (Line 330) are pressed. When the fire button is pressed, the program branches to Line 350 where the USR call is made to the ML subroutine.

This subroutine is actually contained in Line 60 as the string *ML$*. Each pair of characters are a byte of ML code. The assembly listing is provided in Listing 2 for illustration. The ML code is *POKEd* into memory by Line 70. Line 80 is provided as a check on typing skills. If *ML$* is not entered correctly, the program will end before the main menu appears.

The ML subroutine begins by receiving and processing the address of the UL cursor byte, AD, via the USR call and BASIC's INTCNV subroutine. The X register (Line 110) is used as a pointer to the source screen byte being processed. The start and end of graphics pages five and eight are established by Lines 130 through 170. The Y register is used to point to the destination, or blowup, bytes being generated.

Three loops are used. *LOOP1* for eight bits of each source byte, *LOOP2* for 16 horizontal bytes of source screen, and *LOOP3* for vertical increments until the end of page eight is reached. Note that each source byte generates two vertical and two horizontal destination bytes.

The source screen is preserved by using the *ROL ,X* instruction to examine each source bit. If a bit is 'on', the weight corresponding to that bit is selected from the *TABLE* values. This value is then *ORed* with the destination bytes. After completing *LOOP1*, a final *ROL* brings the source byte back to its original state.

It is hoped that you find this program a welcome addition to your graphics repertoire.

Listing 1:

```
10 'BLOWUP
20 'JOSEPH KOHN
30 '22MAR84
40 PCLEAR8:GOTO50
50 CLEAR50,&H4FFF:DEFUSR0=&H5000
60 ML$="BDB3ED1F0196BA5F1F028B18
ED8C478610A78C44338C2D6984240BEC
C4AAA4EA21EDA4EDA8203342ECC426EB
69843001312226A8C232EDD31A8203088
1010AC8C1525CC39C00030000C000300
00C00030000C00030000"
70 FORI=0TO(LEN(ML$)/2)-1:POKE&H
5000+I,VAL("&H"+MID$(ML$,(I*2)+1
,2)):NEXT
80 CK=0:FORI=&H5000 TO &H5055:CK
=CK+PEEK(I):NEXT:IFCK<>7973THEN
END
90 X$(0)="LOAD SOURCE":X$(1)="SA
VE SOURCE":X$(2)="BLOWUP SOURCE"
:X$(3)="SEE SOURCE":X$(4)="SEE B
LOWUP":X$(5)="COPY BLOWUP"
100 X$="BLOWUP":GOSUB420:FORI=0T
O5:PRINTI+1". "X$(I):NEXT
110 PRINT@480,"CHOICE?";:GOSUB41
0:K=VAL(K$):IFK<1 OR K>6 THEN110
120 ON K GOTO 130,190,250,370,38
0,390
130 X$=X$(0):GOSUB420
140 INPUT"dISK OR tAPE";I$
150 LINEINPUT"FILE NAME? ";FI$
160 INPUT"READY";K$:IFK$="N"THEN
100ELSEPMODE4,1:PCLS:SCREEN1,0
170 IFI$="D"THEN LOADM FI$ ELSE
CLOADM FI$
180 GOTO100
190 X$=X$(1):GOSUB420
200 INPUT"dISK OR tAPE";I$
210 LINEINPUT"FILE NAME? ";FI$
220 INPUT"READY";K$:IFK$="N"THEN
100ELSEPMODE4,1:SCREEN1,0
230 IFI$="D"THEN SAVEM FI$,SB,SB
+6144,SB ELSE CSAVEM FI$,SB,SB+6
144,SB
240 GOTO100
250 X$=X$(2):GOSUB420
260 PRINT"USE THE RIGHT JOYSTICK
 TO         SELECT THE SOURCE SECT
ION.":PRINT:PRINT"PRESS THE FIRE
 BUTTON TO BLOWUP.";:PRINT:PRINT
"USE THE space bar TO ABORT.":PR
INT
270 INPUT"READY";K$:IFK$="N"THEN
100ELSEPMODE4,1:SCREEN1,0:SB=PEE
K(&HBA)*256
280 JX=JOYSTK(0):JY=JOYSTK(1)
290 AD=SB+INT(JX/3.937)+32*INT(1
.52381*JY)
300 V1=PEEK(AD):POKEAD,255-V1:V2
=PEEK(AD+3055):POKEAD+3055,255-V
2
310 FB=PEEK(65280)
320 POKEAD,V1:POKEAD+3055,V2
330 IFINKEY$=" "THEN100
340 IF FB=127 OR FB=255 THEN280
350 PMODE4,5:PCLS0:SCREEN1,0:A=U
SR0(AD)
360 GOSUB410:GOTO100
370 PMODE4,1:SCREEN1,0:GOSUB410:
GOTO100
380 PMODE4,5:SCREEN1,0:GOSUB410:
GOTO100
390 X$=X$(5):GOSUB420:INPUT"ARE
YOU SURE";K$:IFK$="N"THEN100
```

```
400 PMODE4,1:SCREEN1,0:FORI=5TO8
:PCOPY I TO I-4:NEXT:GOSUB410:GO
TO100
410 K$=INKEY$:IFK$=""THEN410ELSE
RETURN
420 CLS:X=LEN(X$):Y=INT((32-X)/2
):PRINTSTRING$(Y,"*")X$STRING$(3
2-Y-X,"*"):RETURN
```

Listing 2:

```
                  00010 *BLOWUP
                  00020 *JOSEPH KOHN
                  00030 *23MAR84
                  00040 *
                  00050 *ENTRY:
                  00060 *  PASS SOURCE START BYTE WITH USR
                  00070 *  PMODE4,5 SELECTED
5000              00080          ORG $5000
                  00090 *
5000 BD    B3ED   00100 START    JSR $B3ED        INTCNV
5003 1F    01     00110          TFR D,X          X=START BYTE
                  00120 *GET START OF PAGE 5 AND END OF PAGE 8
5005 96    BA     00130          LDA $BA
5007 5F           00140          CLRB
5008 1F    02     00150          TFR D,Y          Y=START OF PAGE 5
500A 8B    18     00160          ADDA #$18
500C ED    8C 47  00170          STD <ENDBYT,PCR
500F 86    10     00180 LOOP3    LDA #16
5011 A7    8C 44  00190          STA <COUNT,PCR
5014 33    8C 2D  00200 LOOP2    LEAU <TABLE,PCR START OF WEIGHT TABLE
5017 69    84     00210 LOOP1    ROL ,X           GET SOURCE BIT
5019 24    0B     00220          BCC NOT1         GO IF 0
501B EC    C4     00230          LDD ,U           GET WEIGHT
501D AA    A4     00240          ORA ,Y
501F EA    21     00250          ORB 1,Y
5021 ED    A4     00260          STD ,Y           PUT NEW VALUE IN DEST.
5023 ED    A8 20  00270          STD 32,Y
5026 33    42     00280 NOT1     LEAU 2,U         GET NEXT WEIGHT
5028 EC    C4     00290          LDD ,U
502A 26    EB     00300          BNE LOOP1        GO AT END
502C 69    84     00310          ROL ,X
502E 30    01     00320          LEAX 1,X         GET NEXT SOURCE BYTE
5030 31    22     00330          LEAY 2,Y         GET NEXT DEST. BYTE
5032 6A    8C 23  00340          DEC <COUNT,PCR
5035 2E    DD     00350          BGT LOOP2
5037 31    A8 20  00360          LEAY 32,Y        SKIP DEST. ROW
503A 30    88 10  00370          LEAX 16,X        SKIP UNUSED BYTES
503D 10AC  8C 15  00380          CMPY <ENDBYT,PCR
5041 25    CC     00390          BLO LOOP3        GO IF NOT AT END
5043 39           00400          RTS
                  00410 *
5044       C000   00420 TABLE    FDB 49152        16384+32768
5046       3000   00430          FDB 12288        4096+8192
5048       0C00   00440          FDB 3072         1024+2048
504A       0300   00450          FDB 768          256+512
504C       00C0   00460          FDB 192          64+128
504E       0030   00470          FDB 48           16+32
5050       000C   00480          FDB 12           4+8
5052       0003   00490          FDB 3            1+2
5054       0000   00500          FDB 0
                  00510 *
5056              00520 ENDBYT   RMB 2
5058              00530 COUNT    RMB 1
           0000   00540          END
00000 TOTAL ERRORS
```

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BASIC TRAINING

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A Problem Solver's Day At The Races

Joseph Kolar
Rainbow Contributing Editor

Thus far, we have been concentrating on the unique color capabilities of the Color Computer. It was fun creating and experimenting. Since there are some beginners who are more interested in the mathemathical problem-solving ability of the CoCo, why not give them their day in the sun?

Ready? A little background! While showing an English visitor, Jim Saxby, Bognor Regis, Sussex, the myriad features of the CoCo, he interrupted me with, "But can it - - - ?" Hasn't that happened when you were showing off some impressive programs to friends or relatives? Little do they know that it takes more than the wave of the hand to get that ol' blank screen to display whatever they fancy to view.

The problem posed by our English friend had to do with betting a sum on a horse in three consecutive races. All three races had to be won to get paid off.

If you bet a given number of dollars on a race at the going odds and won, you took the winnings and original sum wagered and placed the total on the next race at the going odds. Then, assuming you won, you took the winnings and the amount of the second bet and wagered the total on the third race. The question was, if you won and went to the cashier to collect your winnings, how much money should the cashier give you? The Englishman wanted a program to tell him the amount of money the cashier should fork over.

Gambling is not my game. I don't know if that type of bet is unique to England or if we have something similar on this side of the Atlantic.

Give it your best shot! But, how to proceed?

Define the problem on paper with a simple example that will give the correct answer. This worked-out example can then be a reference that can be used to check out your problem-solving techniques. If you work up an algorithm (method used to solve the problem), and you get the correct answer when you substituted the figures in your reference (paper) solution, then you are on the right track. One right track only, because one correct solution may hide a fault that will cause incorrect solutions for other entered data.

This implies and demands that you should work out one or two additional examples on paper, using different figures to give your algorithm the acid test. If you have three correct reference solutions, you can be fairly certain, if your program arrives at the same answers, that you have succeeded.

Let us take the problem and make a simple wager.

1) $1 is bet at 2 to 1 odds. You win!
2) You get $2 plus $1. (Winning plus the amount of the wager.)
3) You place the total, $3, on the next race at 3 to 1 odds. You win!
4) You get back $9 plus $3. (Winnings plus the amount of the wager.)
5) You place the total, $12, on the next race at 4 to 1 odds. You win!
6) You collect $48 plus $12. Go to the cashier and pick up $60.

Compressed, you have:

Bet	Odds	Total Received
$ 1	2:1	$ 2+$ 1=$ 3
$ 3	3:1	$ 9+$ 3=$12
$12	4:1	$48+$12=$60

The object is to create a program that would take the above data and perform the required calculations to produce the final sum.

First, assign variables to the three elements of the problem. Let N = the amount of the bet. Let X = the higher number of the odds, (first number). Let

---

(Joseph Kolar is a free-lance writer and programmer dedicated to proselytizing for computers in general, and the CoCo specifically.)

Y = the lower number of the odds, (second number).

At this point, you are drooling with anticipation to tackle the problem. Read no further and give it a go.

As you well know, there is more than one way to skin this cat.

After you have created your program, look over the three listings. Three ways are given to approach the problem. The first one suggested the second and the second suggested the third.

Here is one way to approach the problem. After making a set of reference data and verifying the answers, you have control information. As you add program lines to your algorithm, you may check your progress by running a trial example using the control data. Assign needed variables as required.

Look at listing *TRIPLE*. Input the known variables. They could be in any order, (Lines 10-30). Determine the formula that will give you the desired result, (Line 40). Do it on a piece of scratch paper. You want to get an answer of '3' using the three variables, 'N', 'X', and 'Y'. That result will be called 'Z'. You might have to fool around awhile until you get the right answer, '3'. Keep in mind that you may get the right answer, but your formula is incorrect. Do you see why we have two or more sets of control information? Next, print the total, 'Z', (Line 50).

Playing it safe, Line 60 was added to make sure the odds were reset to zero.

To continue; your routine, though not necessarily correct, is complete. Input the new information. Note that the amount now bet is 'Z'. Work out a formula so that you will have the same result in the second routine as the second routine of your control data. Print your answer, 'A', on the screen. Your second routine is complete. Repeat the same train of thought for your final routine. Check by running your control information. To be safe, make sure you check at least two different sets of control data.

If you perform all these seemingly tedious tasks, you will be certain that you have created a good, working program. It will save a lot of debugging time.

Note: Line 60 is not repeated after Line 110. Why Line 60 in the first place? Having finished the first routine and not being sure where you are headed, it doesn't do any harm to clear to '0', variables that you will repeat with different data. "But," you remark, "they weren't used after the first routine?" Right! We found that we didn't need to reset the variables in the first place.

Two things worth mentioning about this anomaly: 1) You can always delete it. 2) You need not condemn yourself for including superfluous lines in your program. If it doesn't affect the results, no harm is done. In this case, it shows you were thinking and keeping all bases covered. As you become more experienced, you would edit this line out. It is quite harmless. By the way, why was it unnecessary in our example?

PRINT MEM will give you a reading of available memory during the course of developing a program. *PRINT X* will give you the current status of variable 'X' under the same conditions. You might *PRINT X,Y,* (without a line number) and get the answer, *0,0,* proving Line 60 to be unnecessary.

Another test, if you suspect you have a superfluous line or routine in your program: *LIST* and insert *'* in front of the suspect line/lines and *RUN*. This can be very helpful.

If you run *TRIPLE* until after the second race result, BREAK and *PRINT X;Y;N,* why do you get *1,3,1* instead of *1,3,3* which you know from your data to be the correct answer?

PRINT X where *'X'* is a variable you want to check, is a valuable tool in a long program to keep track of the value of *'X'* at a given program line. It comes in handy when you are debugging, assuming you know what the variable should be.

Look at listing *TRIPLEA*, a variant of *TRIPLE*. All the odds were listed first. *Y,X* for the first race. *Y1,X1* for the next race and *Y2,X2* for the last race. Why did you have to define the variables differently in this program? *INPUT* all the odds first. Then *INPUT* the wager. Modifying the algorithm in *TRIPLE,* you get the intermediate and final results.

Check it against your prepared control information.

The program, *TRIPLEA* suggested the last variant, *TRIPLEB.* The thought was to enter all the variables, eliminate the intermediate sums and just produce the only sum that really matters; the final sum.

This meant that you had to get a new formula. The almost incomprehensible but correct formula, listed in Line 80 of *TRIPLEB,* is not the only possible form the formula could take. In fact, you may care to get a more meaningful formula. Hint: Look over the other two listings and see what ideas you get. Line 80 is difficult to decipher, but if you want to puzzle it out, substitute the number values of the variables.

"If you perform all these seemingly tedious tasks, you will be certain that you have created a good, working program. It will save a lot of debugging time."

Again and again, you have proven that there is more than one way to do anything on the CoCo. Figure out a better formula for *TRIPLEB* and prove it to yourself.

I hope you enjoyed working out the problem presented by our English cousin, Jim Saxby. It may have practical value for him but we profited by using it as a vehicle to learn a bit more about programming.

Beginning with this month's "graphics issue," an added feature to "Taking BASIC Training" will be a short program listing, without comment, that will create an interesting graphic display.

This is a bonus for interested beginners and a reward for all the faithful readers of this column.

There will be a different, unpublished, original graphic every month to give the beginner some practice in keying in short listings and provide an interesting display. The listings will appear at the end of the regular article.

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Listing 1:

```
0 '<TRIPLE>
1 CLS:PRINT
10 INPUT" ODDS";Y
20 INPUT" TO";X
30 INPUT" AMT. OF BET";N
40 Z=N*Y/X+N
50 PRINT" TOTAL"Z
60 Y=0:X=0
70 INPUT" ODDS";Y
80 INPUT" TO";X
90 PRINT" AMT. BET";Z
100 A=Z*Y/X+Z
110 PRINT" TOTAL"A
120 INPUT" ODDS";Y
130 INPUT" TO";X
140 PRINT" AMT. BET"A
150 B=A*Y/X+A
160 PRINT" TOTAL"B
```

Listing 2

```
0 '<TRIPLEA>
1 CLS:PRINT
10 INPUT"FIRST RACE ODDS";Y
20 INPUT"TO";X
30 INPUT"SECOND RACE ODDS";Y1
40 INPUT "TO";X1
50 INPUT"THIRD RACE ODDS";Y2
60 INPUT"TO";X2
70 PRINT:INPUT" AMOUNT OF BET";N
80 A=N*Y/X+N
90 PRINT "TOTAL AFTER 1ST RACE";
A
100 B=A*Y1/X1+A
110 PRINT"TOTAL AFTER 2ND RACE";
B
120 C=B*Y2/X2+B
130 PRINT "FINAL TOTAL";C
```

Listing 3:

```
0 '<TRIPLEB>
1 CLS:PRINT
10 INPUT"FIRST RACE ODDS";Y
20 INPUT"TO";X
30 INPUT"SECOND RACE ODDS";Y1
40 INPUT "TO";X1
50 INPUT"THIRD RACE ODDS";Y2
60 INPUT"TO";X2
70 PRINT:INPUT" AMOUNT OF BET";N
80 PRINT"FINAL TOTAL="; (( N*Y/X
+N)*(Y1/X1)+(N*Y/X+N))*(Y2/X2)+(
(N*Y/X+N)*(Y1/X1)+(N*Y/X+N))
```

Listing 4: (Bonus)

```
0 ' STROBEA
10 '(C) 1984, J. KOLAR
30 PMODE3:PCLS:PMODE4
40 A=90:B=86:R=76
```

```
50 DIM S(7),T(7)
60 CIRCLE(8,8),8,1:CIRCLE(7,7),8
,1
61 DRAW"BM8,8NL3NR3NU3ND3NE3NF3N
G3H3"
70 GET(0,0)-(16,16),S,G
72 CIRCLE(38,8),6,1:PAINT(40,8),
1,1
73 GET(30,0)-(46,16),T,G
80 PCLS:SCREEN1,1
90 FOR Q=.2 TO .05 STEP -2
100 FORZ=1.5TO4.5 STEPQ:C=Z
110 C=45+C+R*180
120 X=INT(A-6+R*COS(C)):Y=INT(B-
8+R*SIN(C))
130 PUT(X+36,Y+10)-(X+52,Y+26),S
,OR
135 PUT(X+36,Y+10)-(X+52,Y+26),T
,AND:SOUND100,1
140 X=INT(A-6+R*SIN(C)):Y=INT(B-
8+R*COS(C))
150 PUT(X+36,Y+8)-(X+52,Y+23),S,
 OR
155 PUT(X+36,Y+8)-(X+52,Y+23),T,
AND:SOUND100,1
160 NEXT Z,Q
170 PLAY"V20O3L8CO2AFAO3L16CAFAA
FACV15L8FAAFV10L4C":GOTO90
```

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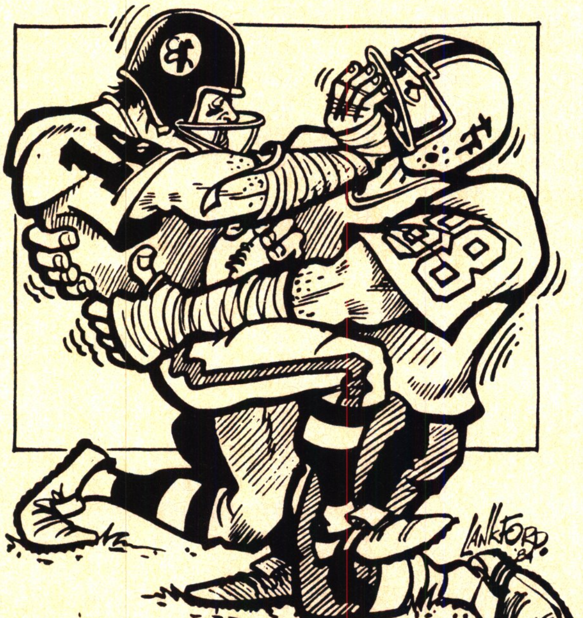

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The Modem To Printer Connection

By Tony DiStefano
Rainbow Contributing Editor

Of all my projects, the short and fast ones seem to be the most popular. The ones that seem to better the computer and help the user on his quest for good computing are the ones that people call me to thank me for. I also get ideas from these people. For instance, the "Dual Cassette" project was an idea I got from a reader. When I presented this, I had forgotten his name, and wanted him to call me. Well, he did; his name is Lennie James. Thank you, Lennie, for the idea. The basis of this month's article actually came from several people. It is based on the RS-232 port of the Color Computer. The original question was this: Is there a way to connect a printer and a modem together so that everything that comes from the modem can also go to the printer at the same time? The answer is "yes." There are many ways of doing this. Some are very easy and fast, others require a bit more work and money. I'll tell you the theory on how to do it and let you decide on what method to use.

What is RS-232 anyway? The full name for this is EIA RS-232C. EIA stands for Electronic Industries Association. The EIA RS-232C standard defines the interfacing between data terminal equipment and data communications equipment employing serial binary data interchange. Electrical signal and mechanical aspects of the interface are well specified. The complete RS-232C interface consists of 25 data lines. This would seem to be enough signals for a complex parallel communication line, but many of the 25 lines are very specialized and a few are undefined. Most computer terminals only require from three to five of these lines to be operational. Table 1 briefly describes all 25 of the defined lines.

(Tony DiStefano is well known as an early specialist in Color Computer hardware projects. He is one of the acknowledged experts on the "insides" of CoCo.)

Table 1

PIN	DESCRIPTION
1	Protective Ground
2	Transmitted Data
3	Received Data
4	Request to Send
5	Clear to Send
6	Data Set Ready
7	Signal Ground
8	Received Line Signal Detector
9	Unassigned
10	Unassigned
11	Unassigned
12	Sec. Rec'd Line Sig. Detector
13	Sec. Clear to Send
14	Sec. Transmitted Data
15	Transmission Signal Element Timing
16	Sec. Received Data
17	Receiver Signal Element Timing
18	Unassigned
19	Sec. Request to Send
20	Data Terminal Ready
21	Signal Quality Detector
22	Ring Indicator
23	Data Signal Rate Selector
24	Transmit Signal Element Timing
25	Unassigned

Table 2

PIN	DESCRIPTION
1	CD — Status Input Line
2	RS232IN — Serial Data Input
3	GROUND — Zero Voltage Reference
4	RS232OUT — Serial Data Out

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The Color Computer uses only four of these lines. They are the four most used in small computers. Table 2 shows the pin and description for the Color Computer version of the RS-232. Pin 1 on the computer is equal to pin 5 or pin 8 on the EIA RS-232C; pin 2 on the computer is equal to pin 3; pin 3 on the computer is equal to pin 7; and pin 4 on the computer is equal to pin 2.

So much for the theory, now for the good part. The secret to this is to connect the Transmit (Serial Output) of the modem to the Receive (Serial Input) of the printer. Now there are many ways to do this. It all depends on what kind of equipment you have. If you are one who just unplugs your printer cable to plug in your modem, you will have the most to do. If you have one of the several switchers available for your modem and printer, all you need is a switch and a piece of wire.

Step 1

Follow these instructions if you have a switcher. If you don't have an SPST switch, RS #275-624 is good and small. First you have to take the switcher apart. You will need the right screwdriver. After the switcher is apart, locate the connector that the modem connects to. Solder one end of a piece of wire to pin 2 of that connector. Solder the other end of this wire to one end of a SPST switch. Solder one end of another piece of wire to the other end of the switch. Now locate the connector that the printer connects to. Solder the last end of wire to pin 4 of that connector. Mount the new switch somewhere in the switcher. Close up the switcher. I'll show you how to use it later.

Step 2

Follow these instructions if you do not have a switcher. Undo the modem connector that plugs into the computer. Solder a wire to pin 3 in the connector. Using a piece of tape, label this wire "G" for ground. Solder another wire to pin 2 of the connector. Reassemble the connector. Undo the printer connector that plugs into the computer. Solder a wire to pin 3 in the connector. Label this wire "G" for ground. Solder another wire to pin 4 of the connector. Reassemble the connector. Solder the two wires labeled G together. Solder the other two wires to each side of an SPST switch. Mount the switch any way you want.

> ***"Is there a way to connect a printer and a modem together so that everything that comes from the modem can also go to the printer at the same time? The answer is 'yes.'"***

In order that the printer prints all that comes in on the modem, the printer parameters must be set correctly. Most modem communications use 300 Baud. That means your printer must be set to 300 Baud. Other parameters, like seven or eight bits, even, odd or no parity, must also be set right. That will depend on what parameters the host computer is using. The fact is that all these parameters must be looked into before the printer will function right. Another thing I should mention is that the printer may or may not print what you type. That depends if you are working in full or half duplex mode. If you are in half duplex, you will not see on paper what you type; with full duplex you will see it. At certain times you may not want to see what you type in, so just change to half duplex if the host computer will allow you.

The next thing you must do is set up the wiring correctly. If you are using Step 1, then you must set the switch you installed to the "on" position and the switcher to the modem side. When you want to use the printer alone, make sure that the switch is in the "off" position and the switcher is set to the printer side. If you followed Step 2, then plug in the modem connector and turn the switch on. When you want to use the printer, turn the switch off and plug the printer connector on.

During normal printing, there is handshaking going on between the printer and the computer. That is, before the printer sends out a character to the printer, the computer checks if the printer is busy. If it is, the computer will wait until the printer is ready. In modem communication, there is no such handshaking. That means if the printer is busy and the modem transmits a character, the printer will miss that character and not print it. This is especially true when the printer is doing a carriage return or line feed. If your printer has an input buffer and can print faster than about 30 characters per second (300 Baud) or 120 characters per second (1200 Baud) you will not miss any characters. Another way to avoid missing characters is if the host computer can be programmed to wait after every carriage return; the printer would have time to catch up.

If you have problems with one of my projects or you want to discuss one of your own projects, I have reserved Monday nights for this. I'll be happy to talk with you if you call me then. The number to call is (514) 473-4910. But limit the calls to Monday nights, any other time is forbidden fruit.

Well, that is it for this time, good modem printing.

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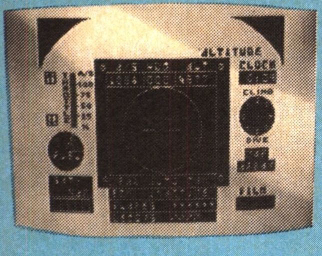
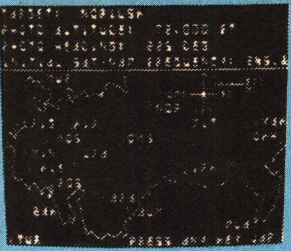
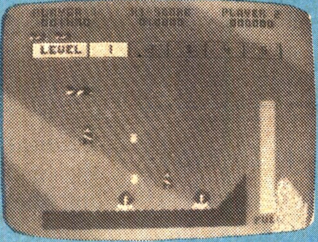




SR-71

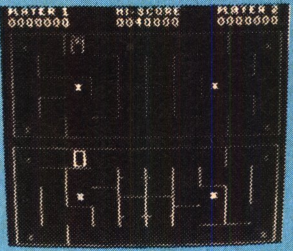
SR-71 is a fast action game in which you are the pilot on a mission to take photographs of missile sites in Russia and deliver them to our processing laboratory in Japan. So real you will feel as if you are in the cockpit on a real spy mission. Elude Russian missiles as well as their detection devices. Another Tom Mix exclusive. A must for the adventurous. Fantastic graphics, color and sound. **32K Ext. Basic** **TAPE $28.95** **DISK $31.95**

SKRAMBLE



Your mission is to penetrate the enemy skramble system and destroy their headquarters. You will start with three of our latest spacefighters equipped with repeating cannon and twin bomb launcher. If you succeed in evading the elaborate ground defenses, you will arrive at the Cave where flying becomes more difficult. In the cave are UFOs, after which you must avoid a hail of meteorites. Very few pilots succeed this far, but if you do, then you must enter the Fortress, followed by the Maze. One or two player game. Machine Language, high speed, Arcade action. Full color graphics with sound. Keyboard or joystick control.

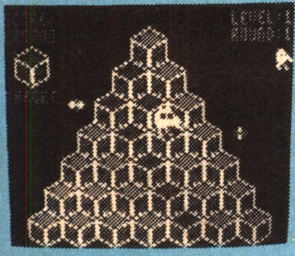
16K MACHINE LANGUAGE **TAPE $24.95** **DISK $27.95**



GRABBER

A pac type game. Two complete mazes jump from one to the other. Probably the most outstanding sound you have ever heard. Arcade Action. Method of play, you are the Grabber. The object is to grab the 8 treasures and store them in the center boxes. You start with 3 Grabbers and get extra ones at 20,000 points. Watch out for the googlies! Super high resolution graphics.

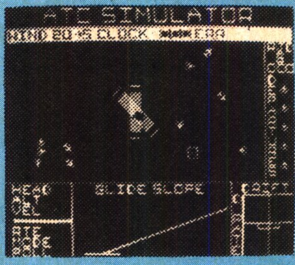
32K MACHINE LANGUAGE
TAPE $27.95 **DISK $30.95**



CU✻BER

Approaches the excitement and challenges of any Video Arcade. The hazards of CU✻BER are many. Help CU✻BER change the colors on the pyramid while avoiding many of the dangers always present. Vipers, the Nurd, the Dork, bonus points all add up to another exciting release from Tom Mix Software.

32K MACHINE LANGUAGE
TAPE $27.95 **DISK $30.95**



AIR TRAFFIC CONTROLLER

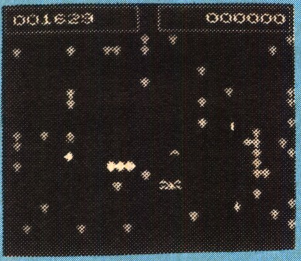
Air Traffic Controller is a computer model of an air traffic control situation for the TRS-80 Color Computer. Remotely Piloted Vehicles (RPV's) are operated by the controller in a situation similar to that of a commercial airline in that you must regulate landings and takeoffs of the vehicles.

32K EXT. BASIC
TAPE $28.95 **DISK $31.95**

KATERPILLAR II

The color computer has needed a perfect centipede type game since day one. You will throw all imitations aside when you see this. So close to the arcade you will start digging for quarters. Grapic to equal "The King" and "Buzzard Bait." Joysticks required.

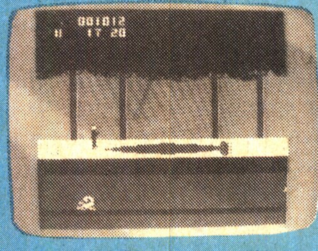
16K MACHINE LANGUAGE
TAPE $24.95 **DISK $27.95**

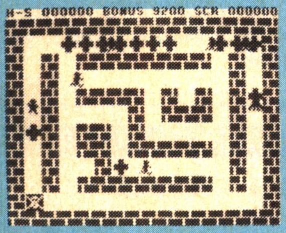


TRAPFALL

The "Pitfalls" in this game are many. Hidden treasures, jump over the pits, swing on the vine, watch out for alligators, beware of the scorpion. Another game for the Color Computer with the same high resolution graphics as "The King."

16K MACHINE LANGUAGE
TAPE $27.95 **DISK $30.95**





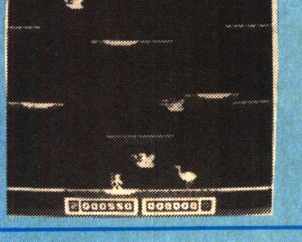
FANGMAN

Fangman is a high-resolution graphics arcade-type game based on the Dracula legend. Plot of Game: You're Dracula in your castle, stalking through a labrynth of passages in search of invading villagers seeking to destroy you by blocking your every path with deadly crosses. Their ally the Sun also wanders your halls, trying to touch you and turn you to bones and dust. Fortunately, you have allies of your own, the vampire bats who cahse down the villagers, holding them till you arive. Joysticks required. **16K MACHINE LANGUAGE**
TAPE $24.95 **DISK $27.95**

BUZZARD BAIT

We've done it again. You thought The King was great? Wait til you see this!! Outstanding high resolution graphics, tremendous sound make this "joust" type game a must for your software collection. As you fly from cloud to cloud you will enjoy sky high excitement dealing with the challenges presented to you by this newest release by Tom Mix Software. Joysticks required.

32K MACHINE LANGUAGE
TAPE $27.95 **DISK $30.95**



UTILITIES

SCREEN PRINT ROUTINE Prints contents of your graphic screen to an Epson, Microline or Radio Shack DMP Printers. Prints positive or reverse format. Horizontal or vertical, small and large printout. Print left, right or center of page. Specify printer when ordering. **TAPE $19.95** **DISK $21.95**

TAPE TO DISK New version works on both 1.0 and 1.1 DOS. Load the contents of most tape to disk automatically. **Machine Language**
TAPE $17.95 **DISK $21.95**

COLOR MONITOR Written in position independent code. (May be located in any free memory). Very compact. Only occupies 1174 bytes of memory. Full featured, includes Break-Pointing of machine language programs, register display and modify, memory display and modify, and block memory move commands. Displays memory in hex and ascii format on one line 8 bytes long. **Machine Language**
TAPE $24.95 **DISK $27.95**

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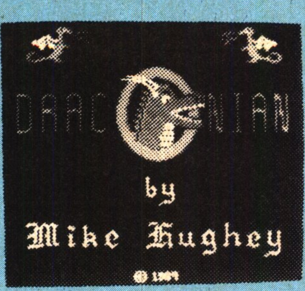
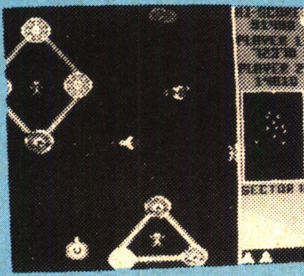




DRACONIAN

You brace yourself as your ship materializes in the enemy sector. Your engine roars to life, and you consult the long-range scanner for the position of the nearest enemy base. As you head for the base, blasting asteroids and space-mines in your path, you suddenly notice a monstrous space-dragon looming before you. Reacting quickly, you dodge his deadly fire-breath and blast him out of existence.

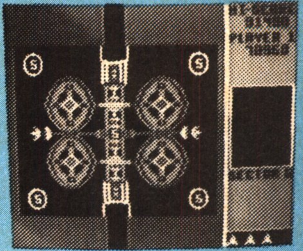
Finally, the enemy base comes into view. Avoiding the enemy fire, you destroy the gun turrets one by one with your rapid-fire torpedoes. Then, with the explosions still echoing around you, you rescue the astronaut who was being held prisoner by the enemy. Your mission is far from over, however, as there are more bases to destroy and more astronauts to rescue before the sector will be secured. And all must be done quickly; if you are too slow, the invincible DRACONIAN will surely seek you out as its next victim.

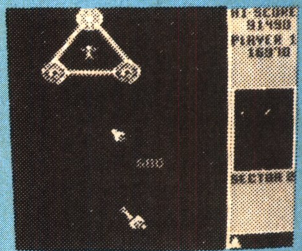
This is it — the single most impressive, awe-inspiring arcade game you can buy for your Color Computer. High-resolution graphics, awesome sound effects, four-voice music, and quality you have to see to believe! Experience the realism of DRACONIAN today!

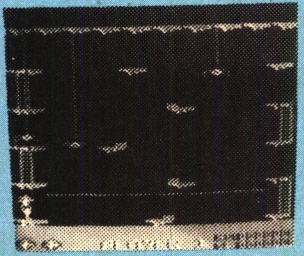
JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

TAPE $27.95 **DISK $30.95**







CRASH

This game is a high resolution Machine Language program with outstanding Arcade type graphics. The game consists of 4 screens. Fly the airplane over and through obstacles. Piloted by "Mario" who also appeard in "The King". The object is to conquer one screen after another but don't "Crash". Great fun for the whole family. For 1 or 2 players. Uses joysticks.

32K MACHINE LANGUAGE

TAPE $24.95 **DISK $27.95**

CHAMBERS

Exciting high resolution graphics game. Multiple screens. Outstanding sound, Chambers is loosely based on Cosmic Chasm. The object in each level is to destroy all of the evil creatures in each room and then go into the main reactor room and blow up the base.

JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

TAPE $24.95 **DISK $27.95**

CHAMBERS
TOM MIX

Score:
Hits Left:

WAREHOUSE MUTANTS

Journey through the warehouse seeking out the Mutants who are out to destroy you. WATCH OUT! They will push crates trying to crush you! Outstanding realism—high resolution graphics—multiple screens.

JOYSTICKS REQUIRED

16K MACH. LANGUAGE

TAPE $24.95

DISK $27.95

QUIX

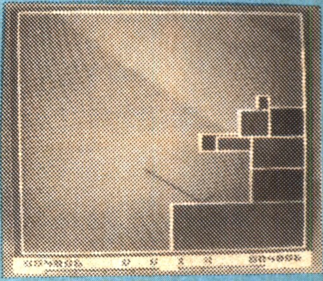
This one is after a popular arcade game with a similar name. Simply frustrating—you'll love it. Done in high resolution graphics with Super Sound.

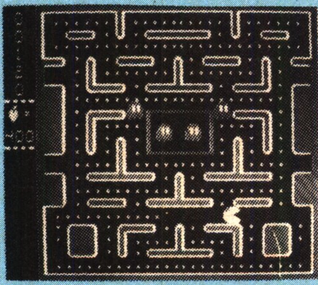
JOYSTICKS REQUIRED

32K MACH. LANGUAGE

TAPE $24.95

DISK $27.95





MS. MAZE

MS. MAZE is remarkable in that it combines brilliant color, high resolution, detailed graphics, and music with a very playable game. Anything that could be done to make the Color Computer look and play like the arcade version has been done. MS. MAZE is without question the closest thing to the arcade Pac games that I have seen for the Coco.

JOYSTICKS REQUIRED

32K MACHINE LANGUAGE

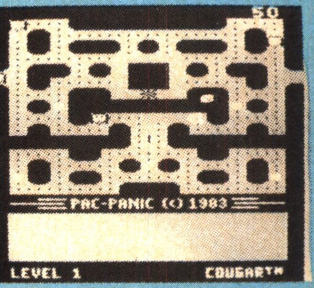
TAPE $24.95 **DISK $27.95**

PAK-PANIC

Pakman is steered thru a maze eating dots and powerpills. Pakman is pursued by four monsters who try to catch and kill him. If Pakman eats a powerpill he becomes powerful and can eat monsters. Monsters try to avoid a powerful Pakman. As monsters are eaten their ghosts appear on the top of the screen. When seven ghosts have appeared one will fly across the screen or they will link together forming a centipede that will travel thru the maze. Pakman has no power against ghosts and centipedes and must avoid them or be killed. **JOYSTICKS REQUIRED**

32K MACHINE LANGUAGE

TAPE $24.95 **DISK $27.95**



PAK TWINS BOTH MS. MAZE & PAK PANIC FOR ONLY **44.90 TAPE**
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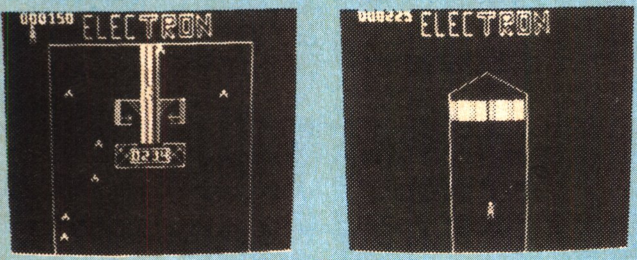
VIP Terminal™
RATED BEST IN JANUARY 1984 "RAINBOW" Choice of 8 hi-res lowercase displays * Memory-Sense with BANK SWITCHING for full use of workspace. **32K (Comes with tape & disk) $49.95** (Tape comes in 16K but without hi-res displays)

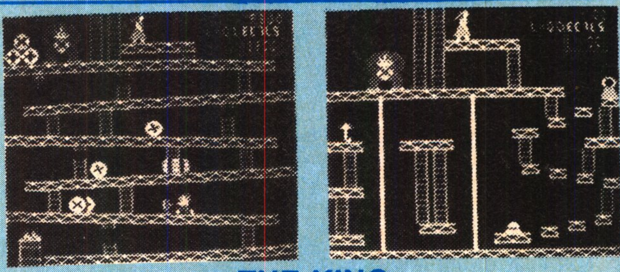
VIP Database™
INCLUDES MAIL MERGE CAPABILITIES TOO! 32K DISK $59.95 64K Required for math package & mail merge.

VIP Disk-ZAP™
Repairs crashed disks.
16K DISK $49.95 Lowercase displays not available with this program.



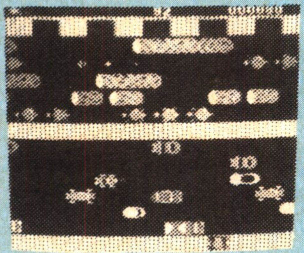
ELECTRON

Electron is composed of four subgames. You must complete one level in order to advance to the next. Supplied with four men, you are subjected to more difficult games as you move ahead. Beam Buggy, Prachnids, Force Fields and a Maze!
JOYSTICKS REQUIRED, 16K MACHINE LANGUAGE
TAPE $24.95 DISK $27.95



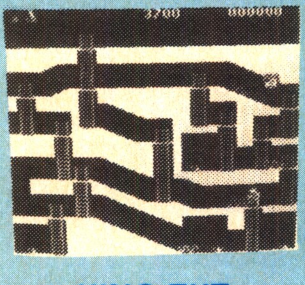
THE KING

This game contains all 4 full graphic screens like the popular arcade game. Exciting sound and realistic graphics. Never before has the color computer seen a game like this. Early reviews say simply outstanding. **JOYSTICKS REQUIRED**
32K MACHINE LANGUAGE
TAPE $26.95 DISK $29.95



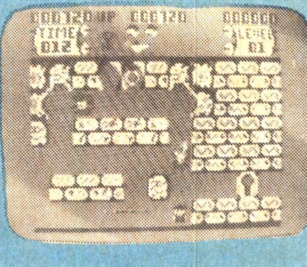
THE FROG

This one will give you hours of exciting play. Cross the busy highway to the safety of the median and rest awhile before you set out across the swollen river teaming with hidden hazards. Outstanding sound and graphics. Play from keyboard or joysticks.
16K MACHINE LANGUAGE
TAPE $27.95 DISK $30.95



KING TUT

Journey through the caverns of King Tut's tomb. You are on a quest to find treasures hidden in the cavrns below. You light your way with only a small candle that grows dimmer as time passes. Watch out for the snakes and the ghost of King Tut himself. **Five** screens challenge your abilities every step of the way. Joysticks required.
16K MACHINE LANGUAGE
TAPE $27.95 DISK $30.95



THE TOUCHSTONE

You are one of many priests of Ra who has accepted the challenge of the touchstone. The challenge is a way for any of Ra's followers to become a favored high priest. Given limited use of Ra's powers, you will battle hidden dangers. Entering the mazes, you must be ready for anything.
32K MACHINE LANGUAGE
TAPE $27.95 DISK $30.95

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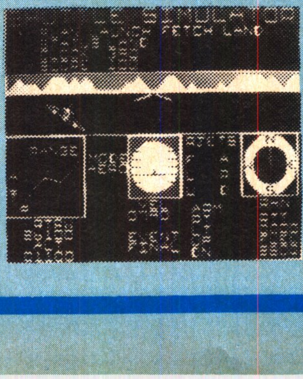

SPACE SHUTTLE

This program gives you the real feeling of flight. Full instrumentation complete to the max. Radar, altimeter, air speed, artificial horizon, fuel gauge, a mission status panel and much more. Actual simulation of space flight, weather conditions must be considered.
JOYSTICKS REQUIRED
32K EXTENDED BASIC
TAPE $28.95 DISK $31.95

EDUCATIONAL

VOCABULARY MANAGEMENT SYSTEM

16K Extended basic/32K for printer output TAPE $39.95 DISK $42.95

The Vocabulary Management System (VMS) is a series of programs designed to aid a parent or teacher in helping children to learn and practice using vocabulary and spelling words. The 9 programs that comprise the VMS include a full feature data entry/edit program, three printer output programs and 5 vocabulary/spelling game programs. The system's many outstanding features include:

—As many as 300 vocabulary words and definitions may be in the computer's memory at one time.
—Words and definitions may be saved on disk or tape.
—Remarks and/or comments can be saved with word files.
—A disk loading menu allows students to load disk files without typing file names.
—Word lists may be quickly alphabetized
—The three printer segments allow you to create and print individualized tests, puzzles, word-searches and worksheets.
—Answer keys may be printed for all worksheets and puzzles.
—The printer segments allow full use of your printer's special features.
—The 5 game programs are based on sound educational principles and provide practice in identifying words and matching them with their definitions in a fast-paced set of activities.

STORY PROBLEMS

STORY PROBLEMS is a program that is designed to give practice in solving story problems (sometimes called statement thought or word problems) on the Color Computer. It is suitable for use in either a home or school environment. It is also a tool that will allow you to create new story problems to suit your children's needs and ability levels. It has many features that make it particularly attractive:

- Story problems involving addition, subtraction, multiplication, division or a combination of the four are presented to the student by slowly scrolling each letter of each problem onto the screen.
- Up to 5 students may use the program at the same time.
- There are 4, user modifiable, skill levels.

16K EXT. BASIC TAPE $19.95 DISK $22.95

MATH DRILL

MATH DRILL is a program designed to help children to practice addition, subtraction, multiplication and division skills on the Color Computer. It has several features that make its use particularly attractive:

- Up to 6 students may use the program at the same time.
- Answers for addition, subtraction and multiplication are entered from right to left, just as they are written on paper.
- Commas may be included in the answers.
- Partial products for the multiplication problems may be computed on the screen.
- Division answers that have a remainder are entered as a whole number followed by the letter "R" and the remainder.
- The are ten, user modifiable, skill levels.
- A "SMILEY FACE" is used for motivation and reward. Its size increases relative to the skill level.
- Skill levels automatically adjust to the student's ability.
- A timer measures the time used to answer each problem and the total time used for a series of problems.
- After a problem has been answered incorrectly the correct answer appears under (above in division) the incorrect answer.

REQUIRES 16K EXT. BASIC
TAPE $19.95 DISK $22.95

ESTIMATE

ESTIMATE is a program designed to help children to practice estimating the answers to addition, subtraction, multiplication and division problems on the Color Computer. It has many features that make its use particularly attractive:

- Up to 5 students may use the program at the same time.
- There are 5, user modifiable, skill levels.
- The acceptable percent error may be changed as a student's skill improves.
- A timer measures the number of seconds used to answer each problem and the total time used for a series of problems.
- If a problem has been answered incorrectly, the student is told the percent error and asked to try again.
- If a problem is answered incorrectly a second time, the student is told the correct answer and the range of acceptable answers is displayed.
- A report is given at the end of each set of problems that includes the number of problems done, the number of problems answered correctly on the first try and the average percent error.
- The (BREAK) key has been disabled so that a child will not inadvertently stop the program from running.

REQURIES 16K EXT. BASIC
TAPE $19.95 DISK $22.95

TEACHER'S DATABASE

TEACHER'S DATABASE is a program designed to allow a teacher to keep a computerized file of information about his/her students. There are many features that make this program particularly attractive:

- Information on as many as 100 students (or more) may be in the computer at one time.
- Each student may have as many as 20 (or more) individual items of data in his/her record.
- The program will run from cassette or disk.
- Cassette and disk files are completely compatible.
- The program is menu driven.
- Records may be easily changed, deleted, combined or added.
- Information about students may be numerical or text.
- Records may be quickly alphabetized.
- Records may be sorted by various criteria.
- Records may be reordered (ranked) based on test scores or other data.
- Data displayed during a sort may be printed on a printer or saved on disk or cassette as a new file.
- A full statistical analysis of data may be done and sent to the printer.
- Student test scores may be weighted.

REQURES 32K EXT. BASIC
TAPE $39.95 DISK $42.95

PRE-ALGEBRA I INTEGERS

INTEGERS is a series of four programs designed to give students practice in working with addition, subtraction, multiplication, division and the comparison of integers. It has many features that make a very valuable tool for introducing and/or maintaining skills:

- Up to 4 students may use the program at the same time.
- There are 9, user modifiable, skill levels.
- Students are given two opportunities to answer a problem.
- A detailed report of student performance, including number correct on first try, number wrong, total time used and percentage score, is presented at the end of a series of problems.
- The programs will run on a 16K TRS-80 Color Computer with or without disk drive.

Four distinct problem formats are presented. The first presents problems in this format: −12 + −9 = ?. The second program presents a problem with missing numerals in this format: −7 −? = 18. The third program presents a problem with a missing sign: 8 − ?6 = 14. The last program asks the student to determine the relationship (=, or) between two statments 3 −9 (??) −4 −5.

TAPE $29.95 DISK $32.95

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GAME

32K
ECB

Tell Your Fortune With Tarot

By Amir Dimitri

XXIII
LE HACKEUR
THE HACKER

Tarot is a form of magic to predict the future. It is basically a set of playing cards with special pictures for fortune telling. Tarot is surrounded with mystery and legend. The precise origin of these ancient cards is not known with certainty. It is widely believed that these cards originated in Europe, however, there are indications that the earliest use of tarot was in India, China and possibly Egypt in the form of clay tablets. Museums and libraries today possess original tarot decks dating from the 14th century.

The word "tarot" is a French adaptation of "tarocco," a game played in Italy during the 14th century with these ancient cards.

(Amir Dimitri is a telecommunications consultant, holds a B.S. in engineering and is a member of the Corporation of Engineers of Quebec. In 1970 he mechanized the telephone switch network requirements and construction expenditure for Bell Canada Montreal Area Engineering. He and his wife, Dora, have three children.)

The tarot deck has 78 cards. Fifty-six cards are known as the Lesser Arcana. These are divided into four suits; Spades, Clubs, Hearts and Diamonds with King, Queen, Cavalier and Page. The remaining 22 cards are known as Trump or the Major Arcana cards. These are numbered XXI to I plus an unnumbered card known as "The Fool." The ordinary pack of playing cards today is a direct descendant of the 14th century tarot deck; the Trump cards were dropped, the Cavalier and Page cards were combined into today's jack, and "The Fool" became the joker.

Could fortunes be revealed with tarot cards? In 14th century Italy, a daughter amused her noble family with hand-painted tarot cards; in 16th century Germany a scholar delved into the hidden meaning of the tarot cards; gypsies wandered throughout Europe for centuries interpreting tarot to eager questioners; in the courts of France, cartomancers and diviners foretold catastrophic events to Napoleon.

It is said that some readings are so accurate as to defy rationale, other readings are so inaccurate as to offer little insight to the questioner. Is this due to some ancient wisdom or pure fantasy? Regardless, tarot has enjoyed a history of more than 500 years and is the forerunner of today's modern pack of cards.

The procedure used in spreading the tarot cards requires the questioner (person seeking an answer to a question) to shuffle the cards face down while stating out loud his specific question to the reader (diviner). The reader then lays out the cards in a prescribed sequence and interprets their symbolic meaning. It is found that for fortune telling, the 22 Major Arcana cards suffice and the Lesser Arcana cards could be avoided for simplicity. In this method, the reader lays down the top 10 cards of the shuffled 22-card Major Arcana deck.

Each Major Arcana card has a descriptive title and a symbolic picture for interpretation. These cards represent the physical and spiritual forces that influence people, namely; Strength, Power, Storms, Death and Religion.

Tarot cards cannot be read from opposite directions as conventional cards. If the card is laid down in reverse (upside down), then the interpretation is weakened or reversed. The presence of one card next to the other strengthens or weakens the interpretation. Readings are based not only on the specific interpretation of each card, but the relative proximity in which the cards fall, their frequency and whether a card is upside down (reversed).

The author of this program has merely mechanized this procedure for the enjoyment of the user. Effort has been spent to faithfully represent each of the 22 Major Arcana cards graphically, together with their respective interpretations in text and provide a comprehensive reading based on the methodology stipulated above. The user can now question the computer and find out whether it can really foretell the future with the tarot cards!

After unplugging the disk controller, loading *Tarot* and *RUNning* it, the user is prompted: "WHAT IS YOUR QUESTION?" Upon entering the question, the following prompt appears: "THE CARDS HAVE BEEN SHUFFLED — DO YOU WISH A RE-SHUFFLE (Y OR N)?" Each time the user presses ENTER, a graphic display of each of the 10 top cards is shown in sequence together with the associated text interpretation based on order, symbolic meaning and position (reversed). After the 10th card is displayed, a reading in text format is automatically displayed for the benefit of the user together with an answer to the question posed. Each display is accompanied with a tune to alert the user. Finally, the user is prompted for another reading if desired. Upon termination, a tune is played together with a closing statement for posterity.

This is how the program works: Setup takes place in Lines 10-1410 with calls to subroutines to run the card shuffling randomizing (1670), card display (1730), reversed card logo, etc. Tarot reading routines take place from Lines 1450-1700. Lines 1730-6110 perform the Extended BASIC graphics subroutines for the Major Arcana 22-card deck. The arrays dimensioned in Line 220 hold the following:

C = Card number
I$ = Card interpretation
N = Card weighting
R$ = Reversed card interpretation
R = Reversed card weighting
N$ = Card order interpretation
D$ = Display interpretation (summary)
D = Display weighting

Change the statements and graphics and good fortune shall follow you for the rest of your days!

XXIII
LE HACKEUR
THE HACKER

170	179	2550	161	4460	103
400	243	2760	23	4660	143
670	216	2940	206	4840	120
970	33	3110	101	5010	45
1170	40	3300	169	5300	82
1420	44	3530	9	5440	85
1640	98	3700	150	5620	149
1850	122	3940	44	5760	138
2050	167	4120	234	5890	138
2290	137	4270	127	6050	37
				END	222

The listing:

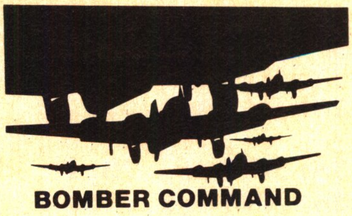
```
10 CLEAR500
20 A3$="T4;O3;L2;C;L4;O2;B;L8;A;
L2.;G;"
30 LA$="C8;U10;R6;D5;L6;R6;D5;C5
;R5"
40 LB$="C8;U10;R6;D5;L6;D5;R6;U5
;D5;C5;R5"
50 LC$="C8;U10;R5;L5;D10;R5;C5;R
5"
60 LD$="C8;U10;R4;F2;D6;G2;L4;R4
;C5;R7"
70 LE$="C8;U10;R5;L5;D5;R5;L5;D5
;R5;C5;R5"
80 LF$="C8;U10;R5;L5;D5;R5;L5;D5
;C5;R10"
90 LG$="C8;U10;R5;L5;D10;R5;U5;L
2;R2;D5;C5;R5"
100 LH$="C8;U10;D5;R5;U5;D10;C5;
R5"
110 LI$="C5;R3;C8;U10;D10;C5;R7"
120 LJ$="C8;U2;D2;R3;U10;D10;C5;
R7"
130 LL$="C8;U10;D10;R5;C5;R5"
140 LM$="C8;U10;R4;D5;U5;R4;D10;
C5;R5"
```

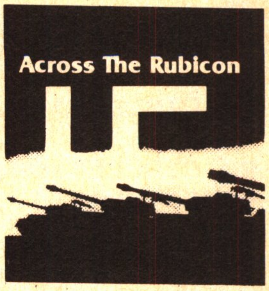
```
150 LN$="C8;U10;F5;U5;D10;C5;R5"
160 LO$="C8;U10;R6;D10;L6;R6;C5;
R5"
170 LP$="C8;U10;R6;D5;L6;R6;C5;D
5;R5"
180 LR$="C8;U10;R7;D5;L7;R4;D2;F
3;D1;C5;R5"
190 LS$="C8;R5;U5;L5;U5;R5;L5;D5
;R5;D5;C5;R5"
200 LT$="C8;C5;R3;C8;U10;L3;R6;L
3;D10;C5;R8"
210 LU$="C8;U10;D10;R5;U10;D10;C
5;R5"
220 LV$="C5;R4;C8;H4;U6;D6;F4;E4
;U6;D6;G4;C5;R9"
230 LX$="C8;U1;E8;U1;D1;G4;H4;U1
;D1;F8;D1;C5;R5"
240 SP$="C5;R5"
250 DIM C(22)
260 DIM I$(22)
270 DIM N(22)
280 DIM R$(22)
290 DIM R(22)
300 DIM N$(10)
310 DIM D$(10)
320 DIM D(10)
330 N22=1:R22=-1
340 N$(1)="***PRESENT POSITION**
*"
350 N$(2)="***IMMEDIATE INVOLVEM
ENT***"
360 N$(3)="***GOAL OR DESTINY***
"
370 N$(4)="***DISTANT PAST***"
380 N$(5)="***RECENT PAST***"
390 N$(6)="***FUTURE INFLUENCE**
*"
400 N$(7)="***THE QUESTIONER***"
410 N$(8)="***ENVIRONMENTAL FACT
ORS***"
420 N$(9)="***INNER EMOTIONS***"
430 N$(10)="***RESULT***"
440 I$(1)="THOUGHTLESSNESS, EXTR
AVAGANCE"
450 R$(1)="APATHY, NEGLIGENCE"
460 N1=-1 :R1=-1
470 I$(2)="SKILL, CREATIVITY"
480 R$(2)="INSECURITY, DELAY"
490 N2=1 : R2=-1
500 I$(3)="WISDOM, SERENITY"
510 I$(17)="MISERY, DECEPTION"
520 R$(3)="CONCEIT, SELFISHNESS"
530 N3=1 :R3=-1
540 I$(4)="ACTION, PROGRESS"
550 R$(4)="INDECISION, ANXIETY"
560 N4=1 :R4=-1
570 I$(5)="AUTHORITY, WEALTH"
580 R$(5)="FEEBLENESS"
```

```
590 N5=1 :R5=-1
600 I$(6)="KINDNESS, HUMILITY"
610 R$(6)="SUSCEPTIBILITY, INSEN
SITIVITY"
620 N6=1:R6=-1
630 I$(7)="LOVE, BEAUTY"
640 R$(7)="INRELIABILITY, FICKLE
NESS"
650 N7=1:R7=-1
660 I$(8)="CHALLENGE, TRIUMPH"
670 R$(8)="DEFEAT, RESIGNATION"
680 N8=1:R8=-1
690 I$(9)="VIRTUE, HONOR"
700 R$(9)="ABUSE, INTOLEREANCE"
710 N9=1:R9=-1
720 I$(10)="PRUDENCE, CAUTION"
730 R$(10)="RASHNESS"
740 N10=1:R10=-1
750 I$(11)="FORTUNE, LUCK"
760 R$(11)="FAILURE, INTERRUPTIO
N"
770 N11=1:R11=-1
780 I$(12)="COURAGE, ENERGY"
790 R$(12)="WEAKNESS, TYRANNY"
800 N12=1:R12=-1
810 I$(13)="READJUSTMENT, TRANSI
TION"
820 R$(13)="EGOISM"
830 N13=1:R13=-1
840 I$(14)="LOSS, FAILURE"
850 R$(14)="RECOVERY"
860 N14=-1:R14=-1
870 I$(15)="PATIENCE, MODERATION
"
880 R$(15)="DISCORD, HOSTILITY"
890 N15=1:R15=-1
900 I$(16)="VIOLENCE, DISASTER"
910 R$(16)="FREEDOM, ENLIGHTENME
NT"
920 N16=-1:R16=1
930 R$(17)="ENTRAPMENT, OPPRESSI
ON"
940 N17=-1:R17=-1
950 I$(18)="HOPE, SATISFACTION"
960 R$(18)="PESSIMISM, DISAPPOIN
TMENT"
970 N18=1:R18=-1
980 I$(19)="CAUTION, DECEPTION"
990 R$(19)="DECEPTIONS, MISTAKES
"
1000 N19=-1:R19=1
1010 I$(20)="HAPPINESS, SUCCESS"
1020 R$(20)="UNHAPPINESS, LONELI
NESS"
1030 N20=1:R20=-1
1040 I$(21)="DEVELOPMENT, PROMOT
ION"
1050 R$(21)="DELAY, DISILLUSION"
```

```
1060 N21=1:R21=-1
1070 I$(22)="PERFECTION, SUCCESS
"
1080 R$(22)="IMPERFECTION"
1090 Y=0
1100 GOSUB6120:PRINT@132,"BY AMI
R DIMITRI":'3352 BREARD, BROSSAR
D J4Z 2E2 QUEBEC-CANADA 1981
1110 FORTM=1TO500:NEXTTM:PRINT@1
32,"";:INPUT"WHAT IS YOUR QUESTI
ON";Q$
1120 IFLEN(Q$)>25THEN1660
1130 FOR J1=1 TO 10
1140 GOSUB 1670
1150 NEXT J1
1160 GOSUB6120:PRINT@224,"THE CA
RDS HAVE BEEN SHUFFLED-DO YOU WI
SH A RE-SHUFFLE ":INPUT" (Y OR N
)";G$
1170 IF G$="N"  THEN 1230
1180 GOSUB6120:PRINT@97,"THE CAR
DS ARE BEING RE-SHUFFLED NOW"
1190 FOR I=1 TO 22
1200 C(I)=0
1210 NEXT I
1220 GOTO 1130
1230 FOR J=1 TO 10
1240 PRINT@480,"";:GOSUB6110:INP
UT"PRESS<ENTER> TO SEE EACH CARD
";H$:CLS
1250 FOR U=1 TO 22
1260 IF C(U)<>J  THEN 1400
1270 M$=""
1280 RX=RND(Y):IFRX>.5 AND RX<.5
5 THEN1290 ELSE1300
1290 M$="(REVERSED)"
1300 GOSUB1730
1310 PRINT"TAROT CARD #"J""M$
1320 PRINT@100, "INTERPRETATION:
"
1330 PRINT@132,"----------------
"
1340 PRINT@225, N$(J)
1350 IFM$<>"(REVERSED)"  THEN 13
80
1360 D$(J)=R$(U):D(J)=R(U)
1370 PRINT@290,D$(J):PRINT:GOTO1
390
1380 D$(J)=I$(U):D(J)=N(U): GOTO
 1370
1390 GOTO 1410
1400 NEXT U
1410 NEXTJ
1420 GOSUB1720
1430 PRINT@130,"PRESENTLY THERE
IS"
1440 IF D(7)+D(1)=0  THEN 1470
1450 PRINT@162,D$(1)" "D$(7)"."
1460 GOTO 1480
1470 PRINT@162,D$(7)"."
1480 PRINT@194,"TO OTHERS YOU AR
E":PRINT@226,D$(8)"."
1490 PRINT@258,"YOUR THOUGHTS TE
ND TOWARD":PRINT@290,D$(9)"."
1500 GOSUB1720
1510 PRINT@162,"ALTHOUGH IN THE
PAST YOU HAD"
1520 IF D(4)+D(5)=0  THEN 1550
1530 PRINT@194,D$(4)" "D$(5)","
1540 GOTO 1560
1550 IFD(4)=-1 THEN PRINT@194,D$
(4)","ELSE PRINT@194,D$(5)","
1560 PRINT@226,"YOU WILL BE IMME
DIATELY":PRINT@258,"INVOLVED WIT
H":PRINT@290,D$(2)"."
1570 PRINT@322,"IN THE FUTURE TH
ERE WILL BE"
1580 IF D(6)+D(3)=0  THEN 1610
1590 PRINT@354,D$(6)" "D$(3)"."
1600 GOTO 2070
1610 IF D(6)=1 THEN PRINT@354,D$
(6)"."ELSE PRINT@354,D$(3)"."
1620 GOSUB1720
1630 PRINT@130,"REGARDING YOUR Q
UESTION,":PRINT@162,CHR$(34)Q$CH
R$(63)CHR$(34):PRINT@194,"THE CA
RDS REVEAL...":PRINT@226,D$(10)"
."
1640 GOSUB1720:PRINT@418,"";:INP
UT"ANOTHER READING? (Y OR N)";Q$
:IFQ$="N"THEN6140
1650 CLS:GOTO1100
1660 GOSUB6120:PRINT@100,"IN FOU
R WORDS OR LESS,":GOTO1110
1670 Z=(RND(Y)*22+1)
1680 X=INT(Z)
1690 IF C(X)<>0  THEN 1670
1700 C(X)=C(X)+J1
1710 RETURN
1720 GOSUB6110:FORTM=1TO3000:NEX
TTM:CLS:GOSUB6120:GOSUB6130:PRIN
T@194,"";:RETURN
1730 PMODE 3,1
1740 PCLS
1750 SCREEN 1,1
1760 ON U GOSUB5990,1790,1970,23
20,2800,2990,3190,3470,3660,3890
,4070,4280,4490,4690,4900,5050,5
220,5420,5530,5700,5780,5900
1770 FORTM=1TO1000:NEXT TM
1780 RETURN
1790 DRAW"BM50,190;R170;U20;L170
;U150;R170;U20;L170;D190;R170;U1
90"
1800 DRAW"BM135,16;"+LI$
1810 DRAW"BM80,185;"+LL$+LE$+SP$
```

```
1820 DRAWLB$+LA$+LT$
1830 DRAWLE$+LL$
1840 DRAW LE$+LU$+LR$
1850 DRAW"BM50,116;C8;E39;R32;U8
;L8;R44;L8;D36;L28;U28"
1860 DRAW"BM220,116;H39;L32"
1870 DRAW"BM176,116;U5;L84;D5;R8
4"
1880 DRAW"BM124,152;U24;L36;D6;R
16;L22;D6;R22;L16;D6;R16;L10;D6;
R30"
1890 DRAW"BM144,152;U24;R36;D6;L
16;R22;D6;L22;R16;D6;L16;R10;D6;
L30"
1900 CIRCLE(120,56),5,8,1,0,1
1910 CIRCLE (148,56),5,8,1,0,1
1920 CIRCLE(135,36),5,8,1,0,1
1930 PAINT(120,56),8,8:PAINT(148
,56),8,8:PAINT(135,36),8,8
1940 PAINT(130,76),7,8:PAINT(124
,113),7,8
1950 PAINT(175,80),6,8
1960 RETURN
1970 LINE(50,190)-(220,1),PSET,B
1980 LINE(50,100)-(220,100),PSET
1990 LINE(50,20)-(220,20),PSET
2000 LINE(50,170)-(220,170),PSET
2010 DRAW"BM130,16;"+LI$+LI$
2020 DRAW"BM112,185;"+LJ$+LU$
2030 DRAWLN$+LO$+LN$
2040 DRAW"BM124,52;C8;U20;F4;D4;
R4;E4;F4;D4;R4;E4;F4;D16;N;F8;H8
;L20;U4;R20;F8"
2050 DRAW"BM124,52;D2;R12;F6;D12
;F12;U8;H4;U4;E2;U8"
2060 DRAW"BM124,64;L4;E4"
2070 DRAW"BM132,80;U9"
2080 DRAW"BM136,96;N;E15;N;H15"
2090 DRAW"BM136,116;H4;R8;G4"
2100 CIRCLE(136,54),15,8,(24/15)
,.25,.5
2110 CIRCLE(136,56),24,8,(32/24)
,.6,1:CIRCLE(136,56),24,8,(32/24
),0,.0625
2120 CIRCLE(132,100),20,8,1,.5,.
75:CIRCLE(140,100),20,8,1,.75,1
2130 LINE(160,100)-(184,20),PSET
:LINE(164,100)-(188,20),PSET
2140 CIRCLE(136,120),4:CIRCLE(13
6,120),16,8,1,.5,1:CIRCLE(136,17
2),16,8,(48/16),.5,1
2150 CIRCLE(96,158),20,8,1,.375,
.75:CIRCLE(108,132),20,8,1,.375,
.875
2160 CIRCLE(176,158),20,8,1,.75,
1:CIRCLE(164,132),20,8,1,.625,1
2170 CIRCLE(176,158),20,8,1,0,.1
25:CIRCLE(164,132),20,8,1,0,.125
2180 PAINT(136,90),5,8
2190 PAINT(136,98),8,8
2200 PAINT(154,98),8,8
2210 PAINT(140,56),7,8
2220 PAINT(154,50),8,8
2230 PAINT(136,50),8,8
2240 PAINT(140,35),8,8
2250 PAINT(60,98),6,8
2260 PAINT(184,98),6,8
2270 PAINT(200,168),5,8
2280 PAINT(153,72),6,8
2290 PAINT(136,168),8,8
2300 PAINT(166,168),7,8
2310 RETURN
2320 LINE(50,190)-(220,1),PSET,B
2330 LINE(50,20)-(220,20),PSET
2340 LINE(50,170)-(220,170),PSET
2350 DRAW"BM122,16;"+LI$+LI$+LI$
2360 DRAW"BM70,185;"+LL$+SP$+LI$
2370 DRAWLM$+LP$:DRAWLE$+LR$:DRA
WLA$+LT$:DRAWLR$+LI$:DRAWLC$+LE$
2380 CIRCLE(132,32),4,8,1,0,1
2390 CIRCLE(132,44),8,8,1,.375,1
2400 CIRCLE(132,44),8,8,1,0,.175
2410 CIRCLE(112,44),4,8,1,.5,1
2420 CIRCLE(112,44),4,8,1,0,.175
2430 CIRCLE(120,44),4,8,1,0,.5
2440 CIRCLE(144,44),4,8,1,0,.5
2450 CIRCLE(152,44),4,8,1,.375,1
2460 DRAW"BM126,52;C8;N;U8;L6;N;
H6;L4;N;H8;D8;R32"
2470 DRAW"BM148,60;U8;N;E8;L4;N;
E6;L6;U4"
2480 CIRCLE(116,64),4,8,1,.25,.7
5
2490 CIRCLE(148,64),4,8,1,.75,1
2500 CIRCLE(148,64),4,8,1,0,.25
2510 CIRCLE(132,76),12,8,(16/12)
,0,1
2520 CIRCLE(116,80),12,8,1,.25,.
75
2530 CIRCLE(148,80),12,8,1,.75,1
2540 CIRCLE(148,80),12,8,1,0,.25
2550 DRAW"C8;D6;U8":DRAW"BM148,9
2;C8;D4"
2560 CIRCLE(120,96),6,8,1,.125,.
625
2570 CIRCLE(144,96),6,8,1,.875,1
2580 CIRCLE(144,96),6,8,1,0,.375
2590 DRAW"BM124,100;N;U14;N;G12;
D4"
2600 DRAW"BM140,100;N;U14;F12;D4
"
2610 CIRCLE(120,108),2,8,1,0,1
2620 CIRCLE(144,108),2,8,1,0,1
2630 CIRCLE(128,112),2,8,1,0,1
2640 CIRCLE(136,112),2,8,1,0,1
2650 CIRCLE(104,120),12,8,1,.25,
```





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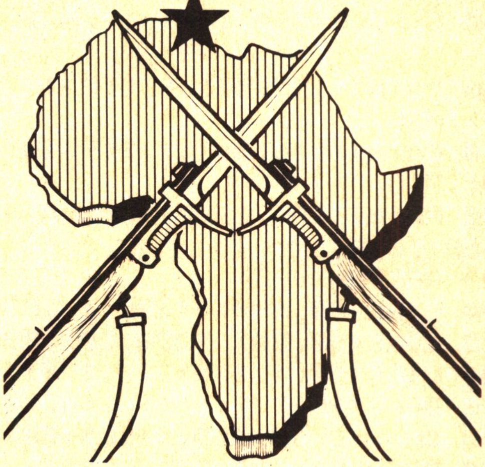

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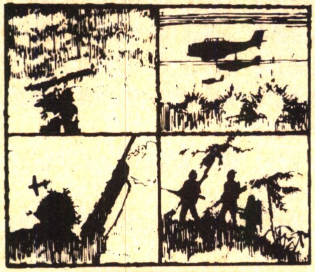

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```
.925
2660 CIRCLE(160,120),12,8,1,.625
,1
2670 CIRCLE(160,120),12,8,1,0,.2
5
2680 CIRCLE(104,136),4,8,1,.75,1
2690 CIRCLE(112,136),20,8,1,.75,
1
2700 CIRCLE(120,136),12,8,1,.25,
.5
2710 CIRCLE(144,136),12,8,1,0,.2
5
2720 CIRCLE(152,136),20,8,1,.5,.
75
2730 CIRCLE(160,136),4,8,1,.5,.7
5
2740 CIRCLE(120,160),12,8,1,.75,
1
2750 CIRCLE(144,160),12,8,1,.5,.
75
2760 PAINT(122,50),8,8:PAINT(142
,50),8,8
2770 PAINT(116,80),7,8:PAINT(148
,80),7,8
2780 PAINT(104,120),8,8:PAINT(20
0,160),6,8
2790 RETURN
2800 LINE(50,190)-(220,1),PSET,B
2810 LINE(50,20)-(220,20),PSET
2820 LINE(50,170)-(220,170),PSET
2830 DRAW"BM127,16;"+LI$+LV$
2840 DRAW"BM90,185;"+LL$+SP$
2850 DRAWLE$+LM$:DRAW LP$+LE$:DR
AW LR$+LE$:DRAWLU$+LR$
2860 CIRCLE(132,48),4,8,1,0,1
2870 CIRCLE(132,52),20,8,1,.5,1
2880 DRAW"BM132,40;C8;N;R4;N;D4;
N;L4;N;U4"
2890 DRAW"BM112,52;D2":DRAW"BM15
2,52;D2"
2900 CIRCLE(116,60),8,8,1,.5,1:C
IRCLE(132,60),8,8,1,.5,1:CIRCLE(
148,60),8,8,1,.5,1
2910 DRAW"BM108,60;D4;F8;R8;N;U1
2;R16;N;U12;R8":DRAW"E8;U4;D4;G8
;D4;L32;U4"
2920 CIRCLE(88,72),28,8,1,0,.25:
CIRCLE(176,72),28,8,1,.25,.5
2930 DRAW"BM132,76;G8;L4;D20;E8;
R8;F8;U20;L4;H8"
2940 CIRCLE(104,108),12,8,1,.25,
.75:CIRCLE(160,108),12,8,1,.75,1
:CIRCLE(160,108),12,8,1,0,.25
2950 CIRCLE(104,148),28,8,1,.75,
1:CIRCLE(160,148),28,8,1,.5,.75
2960 CIRCLE(132,124),48,8,(36/48
),0,.675:CIRCLE(132,124),48,8,(3
6/48),.925,1
2970 PAINT(140,48),8,8:PAINT(132
,100),7,8:PAINT(160,140),8,8:PAI
NT(200,140),6,8
2980 RETURN
2990 LINE(50,190)-(220,1),PSET,B
3000 LINE(50,20)-(220,20),PSET
3010 LINE(50,170)-(220,170),PSET
3020 DRAW"BM128,16;"+LV$
3030 DRAW"BM100,185;"+LJ$
3040 DRAWLU$+LP$:DRAWLI$+LT$:DRA
WLE$+LR$
3050 DRAW"BM132,36;C8;G8;H8;G4;L
4;H4;L4;F12;N;R40;D12"
3060 DRAW"R40;U12;E12;L4;G4;L4;H
4;G8;H8"
3070 CIRCLE(132,76),20,8,(24/20)
,.875,1:CIRCLE(132,76),20,8,(24/
20),0,.125:CIRCLE(132,76),20,8,(
24/20),.375,.625
3080 CIRCLE(132,76),32,8,(24/32)
,.375,.625:CIRCLE(132,76),32,8,(
24/32),.875,1:CIRCLE(132,76),32,
8,(24/32),0,.125
3090 CIRCLE(132,104),20,8,1,.625
,.875
3100 DRAW"BM112,92;C8;N;L20;G8;D
12;G4"
3110 DRAW"BM152,92;N;R20;F8;D12;
F4"
3120 CIRCLE(92,112),20,8,1,.5,.7
5
3130 CIRCLE(172,112),20,8,1,.75,
1
3140 CIRCLE(116,116),16,8,1,0,.5
:CIRCLE(148,116),16,8,1,0,.5
3150 CIRCLE(172,92),100,8,(56/10
0),.22,.471
3160 DRAW"BM72,112;C8;D58;R120;U
58"
3170 PAINT(180,168),8,8:PAINT(15
0,112),7,8:PAINT(200,168),6,8
3180 RETURN
3190 LINE(50,190)-(220,1),PSET,B
3200 LINE(50,20)-(220,20),PSET
3210 LINE(50,170)-(220,170),PSET
3220 DRAW"BM127,16;"+LV$+LI$
3230 DRAW"BM90,185;"+LL$+SP$
3240 DRAWLA$+LM$:DRAWLO$+LU$:DRA
WLR$+LE$:DRAWLU$+LX$
3250 DRAW"BM132,28;C8;N;G48;N;D6
4;N;F48"
3260 DRAW"BM131,30;N;D62;R2;D62;
R3;G4;H4;R8"
3270 CIRCLE(96,76),12,8,(8/12),.
375,1
3280 CIRCLE(96,80),12,8,(8/12),.
5,1
3290 CIRCLE(120,76),12,8,(8/12),
```

WHERE'S-IT

by C.E. Laidlaw

What programs are on this disk? Which disk is my WIDGET program? WHERE'S-IT will answer these questions for you and maintain disk directory index files with up to 972 programs in each. Completely user-friendly, just run WHERE'S-IT and follow the prompts to:

Create index files holding up to 972 programs
Load or save existing index files
Add, delete or update index files for a specific disk
Sort index files alphabetically with a machine language sort
List index files to screen
Print index out with 162 programs to the page

Disk only......$19.95
(32K Extended Color BASIC)

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Creates stand-alone programs
Up to 100 rooms, 60 objects, 30 command words, and 9 conditional flags
Supports tape and disk output
Optional printer output of important sections during creation of ADVENTURE
Complete documentation
Includes sample ADVENTURE
Works with all models of the CoCo except MC-10
Requires 32K Extended Color BASIC

NEW

GRAY LADY

by Terry A. Steen

Control your submarine in its efforts to destroy the enemy fleet. You must launch your sub to surface missiles while avoiding the depth charges. Five different types, hi-res graphics and spectacular sounds. Also a talking version included at no extra charge for those who have an SC01 based voice pack. Four screens and progressive difficulty make this all machine language program a real bargain.

Cassette: $19.95 Disk/Amdisk: $24.95

U.S. COD orders accepted, no charge cards please.
Shipping and handling $3.00
California residents please add 6% sales tax

COLOR TERM +PLUS+

If you're looking for the finest terminal software you can buy, look no further! And now we've added a **high-res screen** display that gives you 32 by 16, 42, 51, or 64 by 24 lines.* And you can switch between the high-res screen and the normal screen ***without*** destroying what you have in the buffer! **+PLUS+** we have a buffer editor, complete up and down load support, on-line cassette or disk reads and writes, off-line and on-line scrolling, pre-entry of data before calling, word wrap, buffer printing, selective printing, change **any** parameter so you can communicate with **any** other computer. You can send and receive Basic programs, ASCII file, as well as machine code, **+PLUS+** you can save your buffer to tape (Tape or Rom version) or disk (Disk version). You can communicate with the local **BBS, Compuserve™, The Source™,** the main frame at work or school, other color computers, Apples, IBM PC'S, TRS-80 Model I, II, III, IV, 12, 16, 100, or any other computer via RS-232.

Compare these features with ***any*** other terminal program:

32×16, 42, 51, 6×24 Screen
Communications BAUD Rate: 110-19200
Printer Baud Rate: 600-9600
Select Half or Full Duplex.
Select Odd, Even, or no Parity.
Select 7 or 8 Bit Words.
Send Control Characters.
Send a True Line Break.
Separate Keys for Escape and Rubout.
Select All Caps If Needed.
Word Wrap — Eliminate Split Words. (32 Character Mode)
Selectable Reverse or Normal Video. (32 Character Mode)

NOW WITH 42, 51 OR 64 CHARACTERS BY 24 LINES!

Scroll Protect Up to 9 Lines.
Automatic Capture of Incoming Files, Send One Line At a Time From Your Buffer.
Has Programmable Prompt for "Send Next Line!!"
Buffer Size Indicator.
Complete Up and Down Load Support.
Improved Buffer Editor.
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On/Off Cassette or Disk Reads and Writes.
Pre-Enter Data Before Going On-Line.
Save/Load Machine Code, Basic Programs or Files.
Select Printer Line Feeds If Needed or Ignore All Line Feeds in Buffer.

*Disk and Rom Pack only (not on tape). PRICE: $29.95 (TAPE) $39.95 (ROM PACK) $39.95 (DISK)

BBS 817-387-8381

HARDWARE

SUPER PRO KEYBOARD — Mark Data replacement. . $64.95

DOUBLE SWITCH I — This is our original switch box. Two **LEDs** show you which port is being used, 1 or 2. High quality parts, and a new great looking yellow face plate $29.95

DOUBLE SWITCH II — Same as the above switch box, but we have added three RCA jacks, and a switch which allows you to switch between your 80 column board output, and your computer output at a touch instead of unplugging $39.95

VIDEO SWITCH — Switch between your 80 column board, and your computer's output. Two **LEDs** display the device $19.95

DOUBLE CABLE — If you don't have a lot of money to spend, you can hook a modem and a printer up at the same time using this Y-Cable. Works with most printers $14.95

WORD PAK (80 Column Board) — This is one of the finest pieces of hardware to come along since the CoCo. Allows you to display a real 80 column screen, not the graphics that are sometimes difficult to read. Comes with a software driver that will interface basic into the 80 column board $139.95

Y-CABLE — Used with the **WORD PAK** when disk drives are being used. Not needed if you own some type of multi-port device, the Multi-Pak interface for instance $29.95

DOUBLE DRIVER — Best video driver available for the Color Computer. Made by our friends at Moreton Bay Software. Specify regular CoCo or CoCo II $24.95

DOUBLE SPEAKER — This plug-in device gives you sound with a monitor. Plugs right in, nothing to solder $19.95

HARD DISK DRIVE FOR THE CoCo WITH CONTROLLER:

5 MEG HARD DISK DRIVE $1299.95
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NEW AND IMPROVED

DOUBLE DOS II

NEW AND IMPROVED!! Double Dos II is an enhanced version of our original **DOUBLE DOS** program. The original Double Dos was so well received that we decided to add even more capabilities, and fix some of the limitations in the original program. With Double Dos you can use 35, 40 or 80 track (double and single sided) drives all on one system, all at the same time. (The use of double sided drives will limit you to three drives.) Works with all types of 5¼ or 3 inch drive systems and All commands are supported in Double Dos! Double Dos is totally transparent to your basic programs! If your system selection is 80 tracks, a **FREE** command will return 158 granules! Compare this to the 68 granules your system now returns. You get 78 granules with a 40 track drive, 10 more than the 35 track system. **EVERY** command in basic is supported by Double Dos. There is only one limitation, you can only open any number of files to one drive at a time, otherwise everything else is the same. Plus you get some great new commands!! Look at what Double Dos will allow as new disk basic commands:

BAUD 1-6 ... change the **BAUD** rate with a command, no pokes!
TRACK 35,36,40,80 ... change the number of tracks.
DOUBLE ... enable the double sided option.
PDIR ... print your directory to the printer.
DUMP ON/OFF ... send a basic program to a friend without using a terminal program!
RATE 6,35 ... change the head stepping rate.
VIDEO ON/OFF ... will give you a reverse screen without a hardware modification.
SCROLL 1-255 ... change the screen scrolling speed.
COMMAND ... will list all new commands.
DUPE 0-2 ... will allow copy & backup from one side of a disk to the other side on double sided systems!
DATE ... you can enter the month, day, and year which will be stored in the directory of your disk each time you save a program or file, and you can see it when you use the DIR command! Very useful when looking for the most current file or program!

AND, all commands can be used inside basic programs because they have been added to disk basics list of commands! You also get full reset protection, which means that you will stay in the 64K mode until you power-down.

PRICE: $29.95 (DISK ONLY) 64K Required

NEW

REAL EIGHTY-COLUMN DISPLAY!

NEW

ULTRA TERM +

PROFESSIONAL PROFESSIONAL PROFESSIONAL PROFESSIONAL

This program is the **ultimate** in coco communicating!! ***Ultra* Term +** is used with a plug-in 80 column board* that gives you **True** 80 columns, not the graphics display that is unreadable at 80 columns. This is truly a ***Professional*** Package that is so easy to use that once you have used it, you'll wonder why other packages are so difficult to use, (except for Color Term + Plus + that is!) After using a terminal program that cannot give you **True** mainframe terminal emulation, you will find ***Ultra* Term +** indispensable! ***Ultra* Term +** even has a host mode that allows you to echo characters like full duplex mainframes do! There are also 10 macro keys which will allow you to save passwords, phone numbers, modem programming information, etc. + PLUS + you can save them to disk. Also, like all ***Professional*** terminal programs you can save your current parameters. This saves you set up time when moving from one system to another. +Plus+ when used with the parallel printer port** you can print what is coming in. And what about documentation? Every feature is explained in detail and indexed for fast look up! There is also a comprehensive help section to aid those unfamiliar with telecommunications. Although this program was designed for the Professional a total novice can use it with ease. Check all the features listed below and then you decide who has the world's smartest terminal!

Baud Rates: 110-4800 (communicate)
600-9600 (printer).
Screen Format: 80 x 25 w/true upper & lower case.
Select half, full duplex or echo.
Select odd, even, mark, space or no parity.
Send all 128 characters from keyboard.
Select 7 or 8 bit words.
Select 1 or 2 stop bits.
Send a true line break.
Select all caps if needed.
Automatic capture of incoming files.
X on/X off capabilities.
Merge text or programs in buffer.
53,000 character buffer (64**K**).
Send and receive BASIC, FILES and machine code.
10 macro keys.
Four buffer send modes (dump, prompted, manual & time delay).
Buffer size indicators (bytes used & bytes remaining).
Buffer editor w/auto key repeat.
Scroll forward & reverse to view buffer & print viewed screen option.
Selectable printer formats (line feeds, etc.).
Selectable trapping of incoming characters.
Print while receiving data*
Buffer editor has these features:
Move forward and reverse through buffer. Insert, type over, delete lines or characters.
Block deletion or start to end of buffer delete.
Save and load macros.
Save and load parameters.
Use 1-4 disk drive (w/SAVE, LOAD, DIR, & granule display).
Easy to use MENU driven format.
Comprehensive users manual.
Works with **ALL** Radio Shack™ Disk Systems and **all** models of color computers.

Still not convinced? How about a 15 day, money back guarantee? If you don't like the package for any reason, we will refund your money upon return of a like-new package.† Who out there is offering you this kind of deal? And customer support was never better. Simply fill out your registration card and send it back to us and you will be notified when new features, improvements, etc. become available because all registered owners will receive **Free** upgrades for a $5.00 shipping and handling fee).

As with all good Professional programs, ***Ultra* Term +** is **all machine code.** This program has been tested by those both familiar and unfamiliar with communications programs. And when you call for some technical support, you **won't** get an answering machine during our business hours (10-5 CST M-Sat.) under normal circumstances. Technical help is usually available all day.

PRICE: *Ultra* Term + — $55.95 (Disk)

Word·Pak (80-column board; includes a software driver so you can use your basic programs with no modification in most cases!). . . . **$139.95** + $3.00 S&H

Y-Cable. . .**$29.95** (Required if expansion port not used with disk drives)

Complete Package ***Ultra* Term +**, Word·Pak & Y Cable [subtract $20.00 if not needed] is only **$210.00**

****Ultra* Term +** supports the 80 column board made by PBJ, Inc. If you already have the board, simply order the program, but those of you who don't can get a good deal.

**Parallel Printer Port from PBJ, Inc.

†Less $10.00 restocking charge.

DOUBLE SPOOLER

Tired of waiting for your listings? printouts? etc.? This is THE Spooling Program!! No need to save your programs in ASCII. You can also spool your files and you can spool **ANYTHING** you print on the screen while a program is running! Requires a minimum of 32K **AND** the 64K computer can spool really **LARGE** files!! Plus more!! PRICE: $19.95 (Tape) $21.95 (Disk)

DOUBLE MAILER

At last a powerful, easy to use, mailing list program for a reasonable price. Up to 200 names can be held in memory for you to change, modify, search or print as you like. Plus, you can print out up to 1800 names without touching the keyboard. Save **thousands** of names on each disk. The machine language sort routine will sort 200 names in as little as 6 seconds! Supports single or double wide labels. Three and four line labels can be intermixed without leaving gaps in your listings! All menu driven, and easy to use. Printer support gives 600-9600 **BAUD** selection, and different print sizes if you wish. 16K Extended

NEW

Double 80 Plus

NEW

Announcing a **BREAK-THROUGH!** Now you can own an 80 column board for $99.95. And you can choose the software you want to buy instead of being charged for something you don't want. Y-Cable available for use with disk drives. Look at these features and compare:

TRUE 80 COLUMN OUTPUT
BUILT IN SWITCH FOR COCO OR DOUBLE 80 PLUS
ADJUSTABLE VIDEO OUTPUT
GOLD PLATED EDGE CONNECTOR
DRIVERS AVAILABLE FOR BASIC, OS9 and **FLEX**
DISPLAY ALL ASCII CHARACTERS
ALTERNATE CHARACTER SETS AVAILABLE
METAL CASE (not cheap plastic)
ULTRA TERM+ available for this board
BACKED BY A 90 DAY PARTS AND LABOR WARRANTY

PRICES:	
DOUBLE 80 PLUS (80 column board)	$99.95
Y-CABLE	29.95
BASIC DRIVER	12.95
OS9 DRIVER	12.95
FLEX DRIVER (available soon)	12.95
ULTRA TERM+ (disk only)	55.95

```
0,.5
3300 CIRCLE(120,80),12,8,(8/12),
0,.5
3310 CIRCLE(144,76),12,8,(8/12),
0,.5
3320 CIRCLE(144,80),12,8,(8/12),
0,.5
3330 CIRCLE(168,76),12,8,(8/12),
.5,1
3340 CIRCLE(168,76),12,8,(8/12),
0,.175
3350 CIRCLE(168,80),12,8,(8/12),
.5,1
3360 CIRCLE(88,120),12,8,1,.25,1
3370 CIRCLE(112,120),12,8,1,.5,1
3380 CIRCLE(112,120),12,8,1,0,.2
5
3390 CIRCLE(152,120),12,8,1,.25,
1
3400 CIRCLE(176,120),12,8,1,.5,1
3410 CIRCLE(176,120),12,8,1,0,.2
5
3420 DRAW"BM100,148;N;H20;N;E20"
3430 DRAW"BM164,148;N;H20;N;E20"
3440 PAINT(112,120),8,8:PAINT(17
6,120),8,8
3450 PAINT(200,168),7,8:PAINT(14
4,76),7,8:PAINT(120,76),7,8
3460 RETURN
3470 LINE(50,190)-(220,1),PSET,B
3480 LINE(50,20)-(220,20),PSET
3490 LINE(50,170)-(220,170),PSET
3500 DRAW"BM127,16;"+LV$+LI$+LI$
3510 DRAW"BM90,185;"+LL$+LE$+SP$
3520 DRAWLC$+LH$:DRAW LA$+LR$:DR
AW LI$+LO$+LT$
3530 CIRCLE(124,36),2,8,(4/2),.7
5,1:CIRCLE(124,36),2,8,(4/2),0,.
25
3540 CIRCLE(124,40),8,8,1,.75,1:
CIRCLE(96,44),20,8,(16/20),0,.25
3550 CIRCLE(124,52),12,8,1,.125,
.375:CIRCLE(112,68),8,8,1,.5,1
3560 CIRCLE(124,52),12,8,1,.625,
.75
3570 DRAW "BM104,68;C8;H4;U8"
3580 CIRCLE(132,92),28,8,1,.5,.7
5:CIRCLE(132,92),28,8,(52/28),.7
5,1
3590 DRAW"BM132,92;C8;N;L28;R28"
3600 CIRCLE(132,132),28,8,1,0,1:
CIRCLE(132,132),20,8,1,0,1
3610 CIRCLE(132,132),8,8,1,0,1
3620 DRAW"BM128,128;C8;N;L16;N;U
16;C5;R8;C8;N;U16;N;R16"
3630 DRAW"C5;D8;C8;N;R16;N;D16;C
5;L8;C8;N;L16;D16"
3640 PAINT(132,90),7,8:PAINT(144
,120),8,8:PAINT(120,120),8,8:PAI
NT(120,140),8,8:PAINT(144,140),8
,8:PAINT(200,168),8,8
3650 RETURN
3660 LINE(50,190)-(220,1),PSET,B
3670 LINE(50,20)-(220,20),PSET
3680 LINE(50,170)-(220,170),PSET
3690 DRAW"BM117,16;"+LV$+LI$:DRA
WLI$+LI$
3700 DRAW"BM90,185;"+LL$+LA$+SP$
:DRAWLJ$+LU$:DRAW LS$+LT$:DRAW L
I$+LC$+LE$
3710 CIRCLE(132,36),4,8,1,0,1:DR
AW"BM132,40;C8;G4;D16;L28;D4;R32
;N;H4;R32;U4"
3720 DRAW"L28;N;G4;U16;H4"
3730 LINE(100,64)-(92,88),PSET
3740 LINE(100,64)-(108,88),PSET
3750 LINE(164,64)-(156,88),PSET
3760 LINE(164,64)-(172,88),PSET
3770 CIRCLE(100,88),8,8,1,0,.5
3780 DRAW"BM92,88;C8;R16"
3790 CIRCLE(164,88),8,8,1,0,.5
3800 DRAW"BM156,88;C8;R16"
3810 DRAW"BM76,116;C8;D4;F4;L4;D
32;R4;G4;D4;R8":DRAW"U4;H4;R4;U3
2;L4;E4;U4;L8"
3820 DRAW"BM76,136;L12;D4;H4;L4;
D8;R4;E4;D4;R12"
3830 LINE(212,140)-(84,136),PSET
3840 LINE(212,140)-(84,144),PSET
3850 PAINT(132,44),7,8:PAINT(68,
140),7,8:PAINT(200,168),6,8
3860 PAINT(100,80),6,8:PAINT(164
,80),6,8
3870 PAINT(100,90),8,8:PAINT(164
,90),8,8
3880 RETURN
3890 LINE(50,190)-(220,1),PSET,B
3900 LINE(50,20)-(220,20),PSET
3910 LINE(50,170)-(220,170),PSET
3920 DRAW"BM127,16;"+LI$+LX$
3930 DRAW"BM100,185;"+LL$+SP$
3940 DRAW LE$+LR$:DRAW LM$+LI$:D
RAW LT$+LE$
3950 CIRCLE(176,52),8,8,1,.5,1:C
IRCLE(176,52),12,8,1,.5,1
3960 DRAW"BM188,52;C8;G2;H2"
3970 DRAW"BM167,52;D92;R4;U92"
3980 CIRCLE(92,72),8,8,(12/8),.5
,1
3990 DRAW"BM99,72;L16"
4000 CIRCLE(92,72),12,8,(16/12),
.5,1
4010 DRAW"BM80,72;L8;D52;R4;U4;R
32;D4;R4;U52;L8"
4020 DRAW"BM76,76;D40;R12;N;R8;U
8;R8;D8;R12;U40;L32"
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```
4030 DRAW"BM92,96;N;E8;N;R8;N;F8
;N;D8;N;G8;N;L8;N;H8;U8"
4040 PAINT(110,114),7,8:PAINT(16
9,140),7,8:PAINT(200,168),6,8:PA
INT(100,70),7,8
4050 PAINT(92,70),6,8
4060 RETURN
4070 LINE(50,190)-(230,1),PSET,B
4080 LINE(50,20)-(230,20),PSET:L
INE(50,170)-(230,170),PSET
4090 DRAW"BM128,16;"+LX$:DRAW"BM
55,185;"+LL$+LA$+SP$
4100 DRAW LR$+LO$:DRAW LU$+LE$+S
P$:DRAW LD$+LE$+SP$
4110 DRAW LF$+LO$:DRAWLR$+LT$:DR
AW LU$+LN$+LE$
4120 CIRCLE(132,60),4,8,1,0,1:CI
RCLE(132,60),8,8,1,0,1:CIRCLE(13
2,60),24,8,1,0,1:CIRCLE(132,60),
32,8,1,0,1
4130 DRAW"BM132,60;C8;N;E18;N;F1
8;N;G18;N;H18"
4140 DRAW"BM130,57;U25;L6;E8;F8;
L6;D25"
4150 CIRCLE(144,104),38,8,(20/38
),0,.25
4160 CIRCLE(184,104),4,8,1,.5,1:
CIRCLE(108,104),80,8,(64/80),0,.
25
4170 CIRCLE(144,132),8,8,1,.5,1:
CIRCLE(142,132),6,8,1,.5,1
4180 CIRCLE(108,132),44,8,(36/44
),0,.25:CIRCLE(108,132),40,8,(32
/40),0,.25
4190 CIRCLE(108,132),28,8,1,0,.2
5:CIRCLE(108,164),4,8,1,.25,.75:
CIRCLE(108,162),4,8,1,.25,.75
4200 CIRCLE(104,116),12,8,1,.5,1
:CIRCLE(104,116),8,8,1,.5,1
4210 DRAW"BM112,116;D12;R4;U12":
DRAW"BM92,116;D12;R4;U12"
4220 CIRCLE(80,144),8,8,1,.5,1:C
IRCLE(80,144),4,8,1,.5,1
4230 DRAW"BM72,144;D8;R4;U8":DRA
W"BM84,144;D8;R4;U8"
4240 PAINT(132,26),8,8:PAINT(132
,30),8,8:PAINT(132,34),8,8
4250 PAINT(132,44),8,8:PAINT(132
,60),8,8:PAINT(116,60),8,8
4260 PAINT(148,60),7,8:PAINT(142
,140),7,8:PAINT(200,168),6,8
4270 RETURN
4280 LINE(50,190)-(220,1),PSET,B
4290 LINE(50,20)-(220,20),PSET:L
INE(50,170)-(220,170),PSET
4300 DRAW"BM126,16;"+LX$+LI$
4310 DRAW"BM100,185;"+LL$+LA$+SP
$
```

```
4320 DRAW LF$+LO$: DRAW LR$+LC$+
LE$
4330 CIRCLE(96,54),16,8,1,0,1:CI
RCLE(168,54),16,8,1,0,1
4340 DRAW"BM156,52;C8;L12;D4;N;R
12;D4;G4;D4"
4350 LINE(140,68)-(148,100),PSET
4360 DRAW"BM144,52;H4;G4;L4;D4;R
8;G4;D4"
4370 DRAW"BM140,48;L4;N;D4;L4;N;
D6;L4;N;D6;L4;D6;N;R8"
4380 DRAW"BM124,56;D4;F4;D4"
4390 DRAW"BM128,116;R4":DRAW"BM1
24,52;L12":DRAW"BM124,56;L12"
4400 DRAW"BM124,56;R16"
4410 DRAW"BM208,92;E12"
4420 CIRCLE(128,92),8,8,(24/8),.
25,.75
4430 CIRCLE(164,100),16,8,1,.5,1
:CIRCLE(200,100),20,8,(12/20),.5
,.875
4440 CIRCLE(156,116),24,8,(8/24)
,0,.5:CIRCLE(220,116),40,8,(32/4
0),.25,.5
4450 CIRCLE(164,144),20,8,1,.75,
1:CIRCLE(200,128),16,8,(42/16),.
25,.5
4460 PAINT(96,54),7,8:PAINT(120,
54),7,8:PAINT(128,55),7,8
4470 PAINT(168,54),7,8:PAINT(148
,54),7,8:PAINT(200,54),8,8
4480 RETURN
4490 LINE(50,190)-(220,1),PSET,B
4500 LINE(50,20)-(220,20),PSET:L
INE(50,170)-(220,170),PSET
4510 DRAW"BM121,16;"+LX$+LI$+LI$
4520 DRAW"BM100,185;"+LL$+LE$+SP
$
4530 DRAWLP$+LE$:DRAWLN$+LD$+LU$
4540 DRAW"BM104,36;C8;D12;R60;D1
22;R12;U134;L72"
4550 DRAW"BM120,36;D24;R2;U24;D2
4;R6;U4;L16;D24;N;D16;L4"
4560 DRAW"G4;D20;R16;U16;N;U8;R1
2;U16;L4;D8;L8;U20"
4570 DRAW"BM104,104;L4;D8;L4;G4;
D20;F4;R32;E4;U12;H4"
4580 DRAW"L4;U16;L4"
4590 DRAW"BM124,120;L16;D8;R16;D
4"
4600 DRAW"BM124,120;L24;D12"
4610 DRAW"BM112,120;N;D8;N;U8;R2
;N;U8;N;D8;R4;U8;L18"
4620 CIRCLE(112,148),8,8,1,0,1
4630 DRAW"BM104,148;D12;F4;N;U10
;R4;N;U8;R4;N;U10;E4;U12"
4640 PAINT(116,88),8,8:PAINT(124
,58),8,8
```

```
4650 PAINT(112,148),8,8:PAINT(12
4,84),8,8
4660 PAINT(106,158),7,8:PAINT(11
0,158),7,8:PAINT(114,158),7,8:PA
INT(118,158),7,8
4670 PAINT(200,168),6,8
4680 RETURN
4690 LINE(50,190)-(220,1),PSET,B
4700 LINE(50,20)-(220,20),PSET:L
INE(50,170)-(220,170),PSET
4710 DRAW"BM119,16;"+LX$+LI$:DRA
W LI$+LI$
4720 DRAW"BM105,185;"+LL$+LA$+SP
$
4730 DRAW LM$+LO$:DRAW LR$+LT$
4740 CIRCLE(132,64),28,8,(24/28)
,.375,1:CIRCLE(132,64),28,8,(24/
28),0,.125
4750 CIRCLE(132,80),16,8,1,0,.5
4760 LINE(132,64)-(136,76),PSET
4770 LINE(136,76)-(128,76),PSET:
LINE(128,76)-(132,64),PSET
4780 DRAW"BM128,64;C8;H4;L8;G4;D
4;F4;R8;E4;U4"
4790 DRAW"BM136,64;E4;R8;F4;D4;G
4;L8;H4;U4"
4800 CIRCLE(104,106),4,8,(6/4),0
,1
4810 CIRCLE(160,106),4,8,(6/4),0
,1
4820 CIRCLE(104,142),4,8,(6/4),0
,1
4830 CIRCLE(160,142),4,8,(6/4),0
,1
4840 LINE(104,104)-(160,140),PSE
T
4850 LINE(104,108)-(160,144),PSE
T
4860 LINE(104,140)-(160,104),PSE
T
4870 LINE(104,144)-(160,108),PSE
T
4880 PAINT(120,64),8,8:PAINT(144
,64),8,8:PAINT(200,168),8,8
4890 RETURN
4900 LINE(50,190)-(220,1),PSET,B
4910 LINE(50,20)-(220,20),PSET:L
INE(50,170)-(220,170),PSET
4920 DRAW"BM120,16;"+LX$+LI$:DRA
WLV$
4930 DRAW"BM87,185;"+LT$+LE$:DRA
W LM$+LP$:DRAW LE$+LR$:DRAWLA$+L
N$:DRAWLC$+LE$
4940 CIRCLE(132,28),12,8,(6/12),
0,1:CIRCLE(132,48),12,8,1,0,1
4950 DRAW"BM132,40;C8;N;L8;R8"
4960 CIRCLE(172,56),12,8,1,.625,
1:CIRCLE(172,56),12,8,1,0,.125
4970 CIRCLE(92,56),12,8,1,.325,.
875:CIRCLE(132,96),20,8,(36/20),
.5,1
4980 DRAW"BM100,48;C8;F20;G20;N;
F12;G4;D4;R4;E4"
4990 DRAW"BM164,48;G20;F20;N;G12
;F4;D4;L4;H4"
5000 CIRCLE(84,96),8,8,(32/8),.7
5,1:CIRCLE(84,96),8,8,(32/8),0,.
25
5010 CIRCLE(180,96),8,8,(32/8),.
25,.75:CIRCLE(98,128),14,8,(8/14
),.5,1:CIRCLE(166,128),14,8,(8/1
4),.5,1
5020 DRAW"BM112,96;D48;G8;R56;H8
;U48"
5030 PAINT(132,28),7,8:PAINT(200
,168),7,8
5040 RETURN
5050 LINE(50,190)-(220,1),PSET,B
5060 LINE(50,20)-(220,20),PSET:L
INE(50,170)-(220,170),PSET
5070 DRAW"BM125,16;"+LX$+LV$
5080 DRAW"BM95,185;"+LL$+LE$+SP$
:DRAWLD$+LI$:DRAWLA$+LB$:DRAWLL$
+LE$
5090 CIRCLE(152,36),8,8,1,.875,1
:CIRCLE(152,36),8,8,1,0,.25
5100 CIRCLE(148,40),12,8,1,.875,
1:CIRCLE(148,40),12,8,1,0,.125
5110 CIRCLE(112,36),8,8,1,.25,.6
25:CIRCLE(116,40),12,8,1,.375,.6
25
5120 CIRCLE(132,64),32,8,(24/32)
,.5,1:CIRCLE(132,56),16,8,(8/16)
,0,.5
5130 CIRCLE(116,64),28,8,(40/28)
,.375,.625:CIRCLE(148,64),28,8,(
40/28),.875,1:CIRCLE(148,64),28,
8,(40/28),0,.125
5140 DRAW"BM104,52;C8;H12":DRAW"
BM160,52;E12"
5150 DRAW"BM116,56;G4;D8;F4;R8;E
8;F8;R8;E4;U8;H4"
5160 DRAW"BM96,84;E4;F32;E32;F4"
5170 CIRCLE(132,128),26,8,(36/26
),0,.5:CIRCLE(132,128),22,8,(32/
22),0,.5
5180 DRAW"BM108,120;C8;G8;R16;H8
":DRAW"BM132,120;G8;R16;H8":DRAW
"BM156,120;G8;R16;H8"
5190 DRAW"BM130,128;D42;R4;U42"
5200 PAINT(132,52),8,8:PAINT(108
,126),7,8:PAINT(132,126),7,8:PAI
NT(156,126),7,8:PAINT(110,130),7
,8:PAINT(132,130),7,8:PAINT(154,
130),7,8:PAINT(132,168),7,8
5210 RETURN
```

```
5220 LINE(50,190)-(220,1),PSET,B
5230 LINE(50,20)-(220,20),PSET:L
INE(50,170)-(220,170),PSET
5240 DRAW"BM120,16;"+LX$+LV$:DRA
WLI$
5250 DRAW"BM55,185;"+LL$+LA$+SP$
:DRAWLM$+LA$:DRAWLI$+LS$:DRAWLO$
+LN$+SP$:DRAWLD$+LE$+SP$:DRAWLD$
+LI$:DRAWLE$+LU$
5260 CIRCLE(112,100),12,8,1,.5,1
5270 DRAW"BM50,124;C8;R52;N;U24;
R24;N;U24;R44;N;R52;U60;L8"
5280 DRAW"BM160,64;N;D12;U12;L8;
N;L16;U8;N;L8":DRAW"BM152,44;R4;
U8;L4;N;L4;U8;L8;D8;L8;D8;L16;D1
6;L12"
5290 LINE(180,44)-(184,56),PSET,
B:LINE(208,48)-(200,60),PSET,B:L
INE(184,64)-(176,80),PSET,B:LINE
(186,80)-(188,92),PSET,B
5300 LINE(188,108)-(196,116),PSE
T,B
5310 DRAW"BM184,100;L8;U8;F8":LI
NE(144,64)-(128,84),PSET,B
5320 DRAW"BM92,36;G12;H8;G8;H8;G
8;D16;F12;E8":DRAW"BM68,68;F8;G4
;F4;E8;F4;G4;F4;E8;F8"
5330 DRAW"BM104,88;E8;H4;E8;H16;
G4;N;G4;H4;E8;H8"
5340 LINE(88,64)-(72,64),PSET,B:
LINE(144,84)-(128,64),PSET,B
5350 LINE(120,152)-(208,132),PSE
T:LINE(108,156)-(208,136),PSET
5360 LINE(120,152)-(132,140),PSE
T:LINE(108,156)-(120,144),PSET
5370 LINE(132,140)-(72,152),PSET
:LINE(120,144)-(72,156),PSET
5380 DRAW"BM208,132;D4"
5390 LINE(72,148)-(76,160),PSET:
DRAW"BM76,160;L16;E12"
5400 PAINT(112,100),7,8:PAINT(13
2,80),7,8:PAINT(200,168),8,8:PAI
NT(190,100),7,8
5410 RETURN
5420 LINE(50,190)-(220,1),PSET,B
5430 LINE(50,20)-(220,20),PSET:L
INE(50,170)-(220,170),PSET
5440 DRAW"BM110,16;"+LX$+LV$:DRA
W LI$+LI$
5450 DRAW"BM105,188;"+LL$+SP$:DR
AW LE$+LT$:DRAW LO$+LI$:DRAW LL$
+LE$
5460 DRAW"BM132,36;C8;D48"
5470 LINE(132,36)-(160,124),PSET
:LINE(132,36)-(104,124),PSET
5480 LINE(180,68)-(132,84),PSET:
LINE(180,68)-(104,124),PSET:LINE
(180,68)-(84,68),PSET
5490 LINE(160,124)-(132,36),PSET
:LINE(160,124)-(132,84),PSET:LIN
E(160,124)-(84,68),PSET
5500 LINE(132,84)-(104,124),PSET
:LINE(132,84)-(84,68),PSET
5510 PAINT(200,168),7,8
5520 RETURN
5530 LINE(50,190)-(220,1),PSET,B
5540 LINE(50,20)-(220,20),PSET:L
INE(50,170)-(220,170),PSET
5550 DRAW"BM110,16;"+LX$+LV$:DRA
W LI$+LI$+LI$
5560 DRAW"BM105,185;"+LL$+LA$+SP
$:DRAW LL$+LU$:DRAW LN$+LE$
5570 CIRCLE(132,54),26,8,1,0,1:C
IRCLE(132,60),32,8,1,0,1
5580 CIRCLE(120,104),8,8,(12/8),
0,.75:CIRCLE(120,104),8,8,(12/8)
,.875,1
5590 CIRCLE(144,104),8,8,(12/8),
0,.625:CIRCLE(144,104),8,8,(12/8
),.75,1
5600 DRAW"BM120,104;C8;N;U12;E8"
5610 DRAW"BM144,104;N;U12;H8"
5620 CIRCLE(132,116),4:CIRCLE(13
2,116),12,8,1,.3,.5:CIRCLE(132,1
16),12,8,1,0,.2
5630 CIRCLE(132,116),16,8,1,.31,
```

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▶ An easy-to-use program in **high resolution color** that will attract little girls to computers.

THE DESIGNER: Create original clothes for a high-fashion model, using more than 1,000 style combinations in thousands of color and fabric options, or design your own original fabrics from textures, stripes and plaids in color combinations almost never seen on the Color Computer. The memory "closet" will hold up to 30 different outfits at once, so girls can save their favorites and show them off. Simple to use and an excellent manual is included.

Program requires 32K Extended Color Basic

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```
.56:CIRCLE(132,116),16,8,1,0,.18
:CIRCLE(132,116),16,8,1,.94,1
5640 CIRCLE(132,140),8,8,(24/8),
0,1
5650 CIRCLE(124,152),8,8,1,.125,
.75
5660 CIRCLE(140,152),8,8,1,.75,1
:CIRCLE(140,152),8,8,1,0,.375
5670 PAINT(132,54),7,8:PAINT(120
,108),8,8:PAINT(144,108),8,8:PAI
NT(132,116),8,8:PAINT(120,122),8
,8:PAINT(144,122),8,8:PAINT(132,
140),8,8:PAINT(120,152),8,8:PAIN
T(144,152),8,8
5680 PAINT(200,168),7,8
5690 RETURN
5700 LINE(50,190)-(220,1),PSET,B
5710 LINE(50,20)-(220,20),PSET:L
INE(50,170)-(220,170),PSET
5720 DRAW"BM120,16;"+LX$+LI$+LX$
5730 DRAW"BM95,185;"+LL$+LE$+SP$
5740 DRAW LS$+LO$:DRAW LL$+LE$:D
RAW LI$+LL$
5750 CIRCLE(132,80),40,8,1,0,1:C
IRCLE(132,80),44,8,1,0,1:CIRCLE(
132,80),52,8,1,0,1:CIRCLE(132,80
),64,8,1,0,1:CIRCLE(132,80),80,8
,1,.875,1:CIRCLE(132,80),80,8,1,
0,.625
5760 PAINT(132,80),8,8:PAINT(174
,80),7,8:PAINT(180,80),7,8:PAINT
(188,80),7,8:PAINT(200,80),7,8:P
AINT(216,80),7,8
5770 RETURN
5780 LINE(50,190)-(220,1),PSET,B
5790 LINE(50,20)-(220,20),PSET:L
INE(50,170)-(220,170),PSET
5800 DRAW"BM120,16;"+LX$+LX$:DRA
WLI$
5810 DRAW"BM85,185;"+LL$+LE$+SP$
:DRAW LJ$+LU$:DRAW LG$+LE$:DRAW
LM$+LE$:DRAW LN$+LT$
5820 CIRCLE(120,52),20,8,1,.5,1:
CIRCLE(84,68),28,8,1,.0625,.875:
CIRCLE(156,72),24,8,1,0,.5:CIRCL
E(176,60),20,8,1,.75,1:CIRCLE(17
6,60),20,8,1,0,.25:CIRCLE(168,44
),12,8,1,.5,1
5830 DRAW"BM168,20;C8;G28;F4;E32
"
5840 CIRCLE(104,4),60,8,1,.125,.
25:CIRCLE(182,82),52,8,1,.5,.625
5850 CIRCLE(104,76),24,8,(12/24)
,.75,1:CIRCLE(104,70),2,8,(6/2),
.25,.75:CIRCLE(128,76),24,8,(12/
24),.25,.5:CIRCLE(128,82),2,8,(6
/2),.75,1:CIRCLE(128,82),2,8,(6/
2),0,.25
5860 DRAW"BM132,128;C8;L32;D4;R5
2;D8;N;R12;L4;D4;R20;U4;L4"
5870 DRAW"BM132,128;R20;U8;L4;U4
;R20;D4;L4;N;L12;D20"
5880 PAINT(200,168),7,8
5890 RETURN
5900 LINE(50,190)-(220,1),PSET,B
5910 LINE(50,20)-(220,20),PSET:L
INE(50,170)-(220,170),PSET
5920 DRAW"BM120,16;"+LX$+LX$:DRA
WLI$
5930 DRAW"BM100,185;"+LL$+LE$+SP
$:DRAW LM$+LO$:DRAW LN$+LD$+LE$
5940 CIRCLE(132,88),48,8,1,0,1
5950 DRAW"BM120,40;C8;D12;R8;E4;
R16;D8;L28;G8;D16;F4;R12;D24"
5960 DRAW"BM128,108;F12;E16;U16;
E8;H16;R4;F12;E12"
5970 PAINT(132,88),6,8:PAINT(100
,88),7,8
5980 RETURN
5990 LINE(50,190)-(220,1),PSET,B
6000 LINE(50,170)-(220,170),PSET
6010 DRAW"BM115,185;"+LL$+LE$+SP
$:DRAW LM$+LA$+LT$
6020 CIRCLE(152,68),28,8,1,.5,1:
CIRCLE(160,68),20,8,1,.5,1:CIRCL
E(152,72),12,8,1,.5,1:CIRCLE(156
,72),8,8,1,.5,1:CIRCLE(112,72),1
2,8,1,.5,1:CIRCLE(108,72),8,8,1,
.5,1
6030 CIRCLE(132,88),24,8,1,.625,
.875:CIRCLE(132,88),20,8,1,0,1
6040 DRAW"BM116,72;C8;D4;R32;U4"
6050 CIRCLE(132,76),16,8,1,.125,
.375:CIRCLE(132,76),16,8,(24/16)
,.1,.42
6060 CIRCLE(116,88),12,8,1,.25,.
75:CIRCLE(148,88),12,8,1,.75,1:C
IRCLE(148,88),12,8,1,0,.25
6070 DRAW"BM116,100;C8;G20;R12;D
12;E12;F12;E12;F12;U12;R12;H20"
6080 PAINT(132,60),8,8:PAINT(152
,60),7,8:PAINT(132,72),8,8:PAINT
(132,95),8,8:PAINT(108,88),7,8:P
AINT(156,88),7,8
6090 PAINT(200,168),6,8
6100 RETURN
6110 PLAY"XA3$;":RETURN
6120 CLS:PRINT@38,"***TAROT CARD
S***":RETURN
6130 PRINT@71,"****READING****":
RETURN
6140 CLS:GOSUB6110
6150 B$="L4;F;L2;E;D;L2.;C;P32;L
4;G;L2;A;L4;P32;A;L2.;B;P32;L4;B
;O3;L1.;C"
6160 PLAY"XB$;":END
```

PRO-COLOR-SERIES

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A fully intergrated series of programs that offers a full range of information tracking capability.

PRO-COLOR-FILE *Enhanced* $79.95

This is the main link in the series. With PRO-COLOR-FILE, you can design a full featured database that is custom tailored to your needs. Its ability to allow the user to custom define formats is unmatched by anything else on the market. A full range of features for information handling is available for any application you might have:

- *60 Data Fields for storing data*
- *1020 bytes capacity per record*
- *Variable record length capability*
- *Multi-drive drive ability*
- *Allows maximum system storage*
- *4 Custom designed screen formats*
- *28 Equation lines (+ - * /)*
- *8 Custom designed report formats*
- *Send reports to printer or screen*
- *Summarize file by groups of records*
- *Column totals and averages*
- *Posting routine performs file wide calculations and updates fields*
- *6 Custom designed mailing label formats*
- *Custom designed menus for selection of reports and label formats*
- *Selectable password protection for data entry screens and reports*
- *Sort any size file*
- *3 level sort capability*
- *Select options for sorting or reporting sub-sets of a file*
- *Duplicate records and fields*
- *Cursor controlled text editing*
- *Fast record selection via indexing*
- *Global file searching*

As a database is created, all of the formats are stored in a file which means you won't have to enter it each time you want to print a report or label. Once your database is up and running, you can install a limited menu that will lead even the most timid user through the program. Since menu selection of report formats are custom made, you'll know exactly which format does what.

PRO-COLOR-FILE is also supported by a NATIONAL USERS' group. Their quarterly newsletter is packed with ideas for using PRO-COLOR-FILE to its fullest. A listing of database programs that have already been created is also provided for comparing notes with other users. Useful database information such as magazine articles are available on a data disk for use on your own system.

Think about it, how can a program exist for over a year and a half, be sold in every state and overseas, and have the support of a national users' group? Simple, it's that good!

PRO-COLOR-FORMS** $39.95

This is the second link in the series. PRO-COLOR-FORMS offers the ability to merge data files with text files. Just imagine being able to place the data you enter with PRO-COLOR-FILE anywhere on a sheet of paper, either by itself or within an external source of text, then you'll have the picture. This means you could write a general letter to a list of people but have each one custom printed with their name and address. You can pre-enter checks into a data base and then have the checks printed on form-feed checks. You might even use form-feed statements for sending out to customers at the end of each month. All of the parameters can be modified to indicate just what size "page" you need for any application:

- *6 Menu Selectable formats*
- *Page width from 40 to 133 characters*
- *Lines per page from 7 to 66*
- *Supports printer control codes*
- *Converts any ASCII file for use*
- *Prints multiple copies*
- *Interfaces with PRO-COLOR-FILE*
- *Password protection*

If you need to generate forms from your data files then chances are you can do just that with PRO-COLOR-FORMS. Form letters, billing statements, index cards, or even post cards can be used easily.

PRO-COLOR-DIR** $24.95

The latest addition to the series is a utility for organizing disk directories into one nice listing. PRO-COLOR-DIR reads the directory of a diskette and then stores valuable information about each program into a master data file. This data file can then be accessed by PRO-COLOR-FILE for sorting, searching and reporting. PRO-COLOR-DIR will create a record for each filename on a diskette and store the following information about each one:

- *Diskette ID name*
- *Date diskette was created*
- *Last date diskette was updated*
- *Filename and extension*
- *File type (BASIC, ML, Text, Data)*
- *Number of Grans allocated*
- *Number of sectors allocated and used*
- *Machine Language program addresses*

PRO-COLOR-DIR allows for hardcopies of a single diskette's files and has a versatile label printing routine. A global replace function can re-store a diskette's files with deleted files being removed or new ones appended automatically.

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Lo-Res Graphics For The 'ASCII-ing'

Hi-Res graphics are all the rage. And CoCo is certainly no slouch in that area. But let's not forget that Lo-Res graphics are very useful, too. In fact, there are some very distinct advantages to using them for certain applications. Particularly useful are the Lo-Res ASCII block graphics characters. The what?

For instance, try this. *POKE 1234, 255*. That orange rectangle that has magically appeared on your screen is ASCII graphics character 255 (ASCII Code 255). Since it has appeared on your text screen which resides from 1024 to 1535 (decimal), then obviously here is one kind of graphics that can be mixed with text. And since it uses ASCII Codes, it can be "massaged" in a program arithmetically.

ASCII (American Standard Code for Information Interchange) Codes are an industry attempt to put some standardization into data recognition between different computers and among data handling peripherals, like printers. Between ASCII Code 32 and 127 things are pretty much standard. Below 32 and above 127, all bets are off. Our little gem, the CoCo, uses the codes above 127 (128-255) to afford us with a plethora of colorful little graphics block characters. These "characters" have no direct keyboard access as do the letters and numerals. We can *POKE* them or *PRINT* them to the screen as with any other character using their ASCII Code in a *POKE* or by using *CHR$* in a *PRINT*. We can use the ASCII Codes in arithmetic expressions to derive other ASCII Codes. Because the ASCII Code is numeric, we can randomize it and display the result (as I did in the title screen in the program that accompanies this article).

"OK," you ask, "what do these guys buy me?" I'm glad you asked! Here are a few of the uses I've put them to:

1) Title and trailer screens
2) Game play boards
3) Maps for games/Adventures
4) Borders around text screens
5) Emphasis or eye-catchers
6) Graphs or charts

Since block graphics are so easy to use, I (being devoutly lazy) use them.

(Jim Schmidt is a senior system analyst by profession. He specializes in financial/business systems development. In his spare time, he writes articles and programs for publication using CoCo.)

16K ECB

32K ECB

the RAINBOW

By Jim Schmidt

However, a text screen full of block graphics is, in reality, a matrix of 32 characters by 16 lines. Trying to figure out where to *POKE* what character in a full screen can be a bit much. I decided to let CoCo help me design and create these screens. I wanted a program that would:

1) Create screens a line (32 characters) at a time
2) Create each line a byte at a time
3) Create each line a group of bytes at a time or a line of all one byte
4) Copy the previous line with one keystroke
5) Copy any previously created line
6) Modify any previously created line(s)
7) Display the screen at any point in its creation
8) Save finished screens to tape or disk for later load/modification
9) Generate a screen and driver program and save to tape or disk
10) View the ASCII blocks to aid in selecting appropriate blocks for the screen construction

I like to rough out a screen first by sketching it on a grid of 32 x 16 squares. I hate drawing grids, so if you have a printer, then Listing 1 is a grid drawing program that should work with any printer at 10 characters per inch.

The Screen Generator — How To Use It

The following refers to Listing 2, the Block Graphics Generator (BGG). After you have roughed out your screen on a grid or otherwise, the next step is to select the graphics characters for each line. You can then note them on the grid, although you will have to write small. From the menu, select *HELP*. You will then be prompted to enter a number from one to 255. This is then the number of the ASCII character from which the display will begin showing you what the various ASCII characters look like. The display will continue until it reaches character number 255 or you press 'Q' for quit. 'P' will pause the display, 'R' will resume after a pause. A single graphic character will be shown next to the ASCII Code for that character and a line of the characters will display to give you some perspective. All 255 ASCII characters can be displayed, but the color characters begin at 128.

At this point you should know what you want to create and the ASCII values that go into each line to make up your screen. It is now a matter of using the BGG to actually create the screen line by line.

The Functions

(A)LL — Creates a line of 32 (ALL) of the same code

(B)YTE/BYTE — Creates a line one

byte at a time keeping you informed where you are in the line (used for detailed areas)

(G)ROUP/GROUP — Creates a line in 'hunks' of the same code and tracks your progress

(R)EPEAT — Copies the immediately previous line

(C)OPY — Copies the requested previously created line (by line number)

(M)ODIFY — Lets you change any existing line

(D)ISPLAY — Lets you see how your screen looks at any point in its creation

(S)AVE — Actually save or load, lets you store a completed screen for later retrieval/modification. Build a library of screens for later customization.

(P)ROGRAM — Will generate a driver program for your completed screen and save the program with your screen in Data statements. This program is saved in ASCII format just as if you had done so with the *,A* option of *SAVE* and *CSAVE. LOAD* or *CLOAD* and run normally. The line numbers generated are very high so that this program can be appended or merged behind your program within which you wish to use this screen. Two versions are available, with or without "visibility" as the screen is drawn. Here is an area where the more astute of you might wish to make some changes to my program. For instance, you might prefer to have your screen loaded into string variables and *PRINT* them. This is the fastest way to display your screen, but you will have to fight the text scroll routine to do it. (Hint: Print the first 15 lines and *POKE* the 16th. Be sure to use a ';' at the end of the *PRINTed* lines.)

(H)ELP — This will display the characters and their ASCII Codes.

Some Final Notes

Let your imagination go. Put color and style in your programs. Be user-friendly to your favorite user — you.

After you have saved your completed screen with or without driver logic, you will be given the option of clearing memory or not. You may want several versions of the same basic screen saved. And by replaying 'N' to the above prompt, you can continue to modify and save the same screen as often as you wish. Actually, the BGG is one big loop. It never ends until you hit BREAK or Reset. But, if you respond 'Y' to the prompt, you begin again at the menu with cleared memory (the computer's, not yours).

Attention 16K/tape users: Because of the large string space requirement, to make BGG fit in 16K, delete Lines 100-760, 1000, and 30000-30800. Also, you must PCLEAR1. I'm afraid that 16K *and* disk won't fly because of the disk buffers. Maybe one of you can chop it down enough to run on 16K disk, but I frankly haven't had much luck doing so.

I am greatly interested in seeing any screens of unusual interest or usage that you may create. I'd appreciate hearing from you and seeing such screens. Also, like all programs, BGG is never finished. Let me hear from you if you enhance BGG in some nifty way.

A word on using these screens in your programs. Please don't think that the screens created by BGG can only be static. There are several ways of "updating" a screen dynamically while your program is running. *POKE* and/or *PRINT* to it. Use several screens in data statements and bounce around among them. Animation it is not. Eye-appeal enhancer, interest raiser it can be. Perhaps more on these techniques in a later RAINBOW.

Have fun!

Listing 1:

1400 47
3300 209
END 95

```
100 '--LISTING ONE---
200 '
300 CLS:PRINT@100,"          M A T R
 I X":PRINT
400 PRINT"          COPYRIGHT (C)
 1983":PRINT
500 PRINT"             J. J. SCHMID
T":PRINT
600 PRINT"         ALL RIGHTS RESE
RVED"
700 FORX=1TO900:NEXT:CLS
800 CLS:PRINT@40,"MATRIX PRINT":
PRINT
900 PRINT"THIS PROGRAM REQUIRES:
"
1000 PRINT"     6 LINES PER INC
H"
1100 PRINT"     10 CHARACTERS P
ER INCH"
1200 PRINT"     PRINT HEAD POSI
TIONED JUST";
1300 PRINT"     UNDER PERFORATI
ON"
1400 PRINT"     9 1/2 X 11 INCH
 PAPER"
1500 PRINT"          (INCLUDING TEAR
 STRIPS)"
1600 PRINT"          no VERTICAL TAB
S SET"
1700 PRINT:PRINT"          <ENTER> W
HEN READY"
1800 LINEINPUTQ$
1900 A=0
2000 FORZ=1TO33
2100 ST$=ST$+": "
2200 NEXTZ
2300 FORX=1TO8
2400 PRINT#-2,""
2500 NEXT
2600 PRINT#-2,"                GRA
PHICS SCREEN GENERATOR DESIGN MA
TRIX":PRINT#-2,"":PRINT#-2,""
2700 PRINT#-2,"POSITION=========
=>1 1 1 1 1 1 1 1 1 1 2 2 2 2 2
2 2 2 2 2 3 3 3"
2800 PRINT#-2," 1 2 3 4 5 6 7 8
9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4
5 6 7 8 9 0 1 2    LINE NO."
2900 PRINT#-2,""
3000 FORY=1TO16
3100 A=A+1
3200 PRINT#-2,STRING$(65,"-")
3300 PRINT#-2,ST$;:PRINT#-2,"  <
```

```
===   ";A
3400 NEXT
3500 A=0
3600 PRINT#-2,STRING$(65,"-")
3700 PRINT#-2,""
3800 FORX=1TO18
3900 PRINT#-2,""
4000 NEXT
4100 CLS:PRINT@204,"AGAIN???"
4200 R$=INKEY$:IFR$=""THEN4200
4300 CLS
4400 IFLEFT$(R$,1)="Y"THENRUNELS
EEND
```

2000	148	15510	85
4300	20	16900	206
6000	5	18700	203
7900	108	19800	215
9900	229	30000	209
11900	58	END	131
13700	236		

Listing 2:

```
100 '--LISTING TWO---
200 '--BLOCK GRAPHICS--
300 '--SCREEN BUILDER--
400 '
500 '--A UTILITY PROGRAM--
600 '
700 '--BY JIM SCHMIDT
710 '      196A ARLENE CT.
720 '      WHEELING, IL.
730 '               60090
733 '
740 '--COPYRIGHT (C) 1983--
750 '--ALL RIGHTS RESERVED--
760 '
1000 CLEAR4200
1050 CLS0:GOSUB30000
1500 DIML$(16):DIMP$(32)
1600 CLS:L=1:GOTO1800
1700 L=L+1:CLS:IFL=17 THEN 7400
1800 PRINT@5,"":PRINT@33,"aLL (A
SCII #)":PRINT@48,"bYTE/BYTE"
1900 PRINT@97,"gROUP/GROUP":PRIN
T@112,"rEPEAT LAST LINE"
2000 PRINT@161,"cOPY A LINE":PRI
NT@176,"mODIFY A LINE"
2100 PRINT@225,"dISPLAY":PRINT@2
40,"sAVE/LOAD SCREEN"
2200 PRINT@289,"pROGRAM SAVE":PR
INT@304,"hELP (ASCII)"
2300 PRINT@359,"ENTER YOUR CHOIC
E"
2400 IF L<17 THENPRINT@424,"NEXT
 LINE IS ";L
2500 A$=INKEY$:IF A$="" THEN 250
0
2600 IF A$ ="A" OR A$="B" OR A$=
"C" OR A$="G" OR A$="H" OR A$="S
" OR A$="D" OR A$="M" OR A$="R"
OR A$="P" THEN SOUND169,1:SOUND1
69,1
2700 IF L<17 THEN IF A$="B" THEN
 3800
2800 IF L<17 THEN IF A$="R" THEN
 5900
2900 IF L<17 THEN IF A$="A" THEN
 6400
3000 IF L<17 THEN IF A$="C" THEN
 8500
3100 IF A$="D" THEN 7400
3200 IF A$="M" THEN 12900
3300 IF A$="S" THEN 15450
3400 IF L<17 THEN IF A$="G" THEN
 10900
3500 IF L=17 THEN IF A$="P" THEN
 17200
3600 IF A$="H" THEN 9700
3700 GOTO2500
3800 P=1:CLS
3900 CLS:PRINT@1,"":PRINT"LINE="
;L;"COLUMN=";P
4000 PRINT:PRINTL$(L):PRINT
4300 PRINT"ENTER ASCII VALUE  WA
NTED OR     <ENTER> TO REPEAT LAS
T ONE."
4400 PRINT
4500 INPUT"CHARACTER ASCII VALUE
";CH$
4600 SOUND222,1:IF P=32 THEN SOU
ND222,3
4700 IF CH$="" THEN 5100
4800 IF LEN(CH$) <3 THEN CH$=STR
ING$(3-LEN(CH$),"0")+CH$
4900 NN=VAL(CH$)
5000 IF NN <1 OR NN>255 THEN PRI
NT"INVALID ENTRY":SOUND7,7:FORH=
1TO300:NEXT:GOTO3900
5100 IF CH$="" AND LEFT$(L$(L),3
)="" THEN PRINT@490,"NO ENTRY YE
T":SOUND7,7:FORH=1TO400:NEXT:GOT
O3900
5200 IF CH$="" THEN CH$=SA$:GOTO
 5400
5300 SA$=CH$
5400 L$(L)=L$(L)+CH$
5500 IF P=32 AND BR$="Y" THEN BR
$="":L=SL:GOTO1700
5600 IF P=32 THEN 1700
5700 P=P+1
5800 GOTO3900
5900 L$(L)=L$(L-1)
6000 IF L$(1)="" THEN PRINT@359,
"NO VALID LINE YET":SOUND7,7:FOR
 H=1TO300:NEXT:CLS:GOTO1800
```

```
6100 PRINT@359,"  LINE REPEATED
        ":SOUND222,1
6200 FORH=1TO400:NEXT
6300 GOTO 1700
6400 CLS:PRINT@128,"":INPUT"ENTE
R ASCII CODE FOR ENTIRE LINE";CH
$
6500 IF LEN(CH$)<3 THEN CH$=STRI
NG$(3-LEN(CH$),"0")+CH$
6600 IF LEN(CH$)>3 THEN PRINT"
  TOO LONG":SOUND7,7:FOR H=1TO40
0:NEXT:GOTO 6400
6700 IF VAL(CH$)>255 OR VAL(CH$)
<1 THEN PRINT"      INVALID ENTRY
":SOUND7,7:FORH=1TO400:NEXT:GOTO
6400
6800 FOR TY=1 TO 32
6900 L$(L)=L$(L)+CH$
7000 NEXT
7100 PRINT"       LINE BUILT":SO
UND222,6
7200 FORH=1TO400:NEXT
7300 GOTO1700
7400 CLS:PS=1:L=1:BB=1024:EB=105
5
7500 FOROL=1TO16:FORIL=BB TO EB:
IFL$(L)="" THEN 9600:BY$=MID$(L$
(L),PS,3):POKEIL,VAL(BY$):PS=PS+
3:NEXT:EB=EB+32:BB=BB+32:PS=1:L=
L+1:NEXT
7600 FORIL=BB TO EB
7700 IFL$(L)="" THEN 9600
7800 BY$=MID$(L$(L),PS,3)
7900 POKEIL,VAL(BY$)
8000 PS=PS+3:NEXT
8200 EB=EB+32:BB=BB+32:PS=1:L=L+
1:NEXT
8400 NM$="Y":FORH=1TO2500:NEXT:P
RINT@224,"   THE SCREEN IS READY
 TO SAVE":FOR H=1TO50:SOUND222,1
:NEXT:CLS:GOTO1800
8500 CLS:PRINT:PRINT:PRINT"
    NEXT LINE IS ";L
8600 PRINT
8700 IF L=1 THEN PRINT"          N
O LINES EXIST YET":SOUND7,7:FORH
=1TO400:NEXT:CLS:GOTO1800
8800 INPUT"LINE # OF LINE TO BE
COPIED";LN
8900 PRINT
9000 IF LN=>L OR LN>16  THEN PRI
NT" THAT LINE DOES NOT EXIST":SO
UND7,7:FORH=1TO400:NEXT:CLS:GOTO
1800
9100 L$(L)=L$(LN)
9300 PRINT:PRINT"        LINE CO
PIED":SOUND222,6
9400 FORH=1TO400:NEXT
9500 GOTO1700
9600 FORH=1TO2500:NEXT:CLS:GOTO1
800
9700 CLS:PRINT:PRINT"ENTER 0 TO
RETURN TO MENU"
9900 INPUT"START AT NNN";ST
9950 IFST=0 THENCLS:GOTO1800
10000 IFST >255 THEN PRINT"255 M
AXIMUM":SOUND7,7:FORDE=1TO400:NE
XT:CLS:GOTO9700
10050 CLS
10100 FOR H=ST TO 255
10300 PRINT@264,"PRESS Q TO QUIT
"
10302 PRINT@101,"PRESS P TO PAUS
E DISPLAY"
10303 PRINT@133,"PRESS R TO RESU
ME"
10320 Q$=INKEY$
10500 IFQ$="Q" THEN CLS:SOUND222
,6:GOTO1800
10510 IFQ$="P"THENGOSUB 40000
10520 PRINT@200,"ASCII ";ST;"= "
;:POKE1235,H
10530 FORLL=1344TO1375:POKELL,H:
NEXT
10600 FOR HH=1TO1000:NEXT
10700 ST=ST+1
10800 NEXT:CLS:GOTO1800
10900 P=1
11000 CLS:PRINT:PRINT:PRINTL$(L)
11200 PRINT"BUILDING LINE NO ";L
:PRINT
11300 PRINT"NEXT COLUMN IS ";P:P
RINT
11400 PRINT"POSITIONS REMAINING=
";(32-P)+1
11500 PRINT
11600 INPUT"ASCII #";CH$:SOUND22
2,1:IF P=32 THEN SOUND222,1
11700 PRINT
11800 IFCH$=""THEN 11000
11900 IF LEN(CH$)<3 THENCH$=STRI
NG$(3-LEN(CH$),"0")+CH$
12000 NN=VAL(CH$)
12100 IFNN<1 OR NN>255 THENPRINT
"INVALID ENTRY":SOUND7,7:FORH=1T
O400:NEXT:GOTO11000
12200 INPUT"HOW MANY";HM
12250 SOUND222,1
12300 IF HM> (32-P)+1 THEN PRINT
"TOO MANY":SOUND7,7:FORH=1TO400:
NEXT:GOTO12200
12400 FORLO=1TOHM:L$(L)=L$(L)+CH
$:P=P+1:NEXT
12800 IF P=33 THEN 1700 ELSE 110
00
12900 CLS:PRINT:PRINT:P=1
```

```
13000 INPUT"NUMBER OF LINE TO MO
DIFY";NL
13100 IF NL=0 OR NL>16 THEN CLS:
GOTO1800
13150 IF L$(NL)="" THEN PRINT@13
0,"NO SUCH LINE EXISTS":SOUND7,7
:FORH=1TO400:NEXT:CLS:GOTO1800
13200 PRINT
13300 PRINT"rEVIEW OR dELETE AND
 DO OVER?"
13400 RD$=INKEY$:IF RD$="" THEN
13400 ELSE SOUND222,6
13500 IF RD$<>"R" AND RD$<>"D" T
HEN 13400
13600 IF RD$="D" THEN SL=L-1:L=N
L:BR$="Y":L$(L)="":GOTO3800
13700 SL=L:ML$=L$(NL)
13800 FOR LO=1 TO 96 STEP 3
13900 OB$=MID$(L$(NL),LO,3)
14000 CLS:PRINT
14100 PRINT"COLUMN NUMBER= ";P
14200 PRINT"ENTER Q TO QUIT CHAN
GES"
14300 PRINT"THIS BYTE IS NOW =";
OB$
14400 INPUT"<ENTER> IF OK OR ENT
ER NEW VALUE";NB$
14500 SOUND222,6
14600 IF NB$="" THEN P=P+1:GOTO
15300
14700 IF NB$="Q" THEN 15400
14800 IF LEN(NB$)<3 THEN NB$=STR
ING$(3-LEN(NB$),"0")+NB$
14900 NN=VAL(NB$)
15000 IF NN<1 OR NN>255 THEN PRI
NT"INVALID ENTRY":SOUND7,7:FORH=
1TO400:NEXT:GOTO13800
15100 MID$(ML$,LO,3)=NB$
15200 P=P+1
15300 NEXT
15400 L$(NL)=ML$:L=SL:CLS:GOTO18
00
15450 CLS:PRINT:PRINT:PRINT"
      dISK OR tAPE??":PRINT:PRINT
15460 QU$=INKEY$:IFQU$=""THEN154
60
15470 IFQU$<>"D" AND QU$<>"T"THE
N15450
15480 IFQU$="D"THENDV=1ELSEDV=-1
15500 PRINT:PRINT"          READY
YOUR DRIVE":PRINT
15510 FORDE=1TO1000:NEXT
15600 CLS:PRINT@137,"sAVE OR lOA
D??"
15700 SL$=INKEY$:IF SL$="" THEN
15700
15800 SOUND222,2:IF SL$<>"S" AND
 SL$<>"L" THEN 15600
```

```
15848 PRINT
15850 IF SL$="S" AND L<>17 THENP
RINT"NOT A COMPLETE SCREEN":SOUN
D7,7:FORH=1TO400:NEXT:CLS:GOTO18
00
15900 IF SL$="S" THEN SL$="O" EL
SE SL$="I"
16000 PRINT:INPUT"FILENAME";FI$
16100 FI$=LEFT$(FI$,8)
16200 PRINT@294,"  OPENING FILE"
16300 OPEN SL$,#DV,FI$
16400 PRINT@293," <ANY KEY TO BE
GIN>"
16500 Q$=INKEY$:IF Q$="" THEN 16
500 ELSE SOUND 222,2
16600 FORL=1TO16
16700 IF SL$="I" THEN INPUT #DV,
 L$(L):PRINT@294,"     READING "
:FOR RT=1TO100:NEXT
16800 IF SL$="O" THEN PRINT#DV,L
$(L):PRINT@294,"    WRITING ":FO
RWT=1TO100:NEXT
16900 PRINT@296,"             "
17000 NEXT
17100 CLOSE#DV
17105 IF SL$="I" THEN17140
17110 PRINT"WANT STORAGE CLEARED
 <Y/N>?"
17120 Q$=INKEY$:IFQ$=""THEN 1712
0
17130 IFQ$="Y" THEN RUN
17140 L=17:CLS:GOTO1800
17200 IF ND$="" THEN DIM DA$(32)
17210 ND$="Y"
17300 CLS:PRINT@200,"hIDDEN OR v
ISIBLE?"
17310 OP$=INKEY$:IFOP$=""THEN173
10
17320 IFOP$<>"H"ANDOP$<>"V"THEN1
7310
17330 CLS:PRINT@200,"PLEASE WAIT
..."
17400 NP=1:D=1:L=1
17500 FORHH=63000 TO 63015
17600 FORH=1TO32
17700 NB$=MID$(L$(L),NP,3)
17800 IF SW$="Y" THEN 18200
17900 FU$=STR$(HH)
18000 UF$=RIGHT$(FU$,5)
18100 DA$(D)=UF$+" DATA":SW$="Y"
18200 IF H<32 THENDA$(D)=DA$(D)+
NB$+CHR$(44) ELSE DA$(D)=DA$(D)+
NB$
18300 NP=NP+3
18400 NEXT
18500 NP=1:L=L+1:D=D+1:SW$="N"
18600 NEXT
18650 IFOP$="H"THENI1$="63016 PC
```

```
LS:SCREEN1"ELSEI1$=""
18700 I2$="63017 BB=1024:EB=1055
"
18800 I3$="63018 FOR OL=1TO16"
18900 I4$="63019 FOR IL=BB TO EB
"
19000 I5$="63020 READ BY$"
19100 I6$="63021 POKEIL,VAL(BY$)
"
19300 I7$="63023 NEXT"
19400 I8$="63024 EB=EB+32:BB=BB+
32"
19500 I9$="63025 NEXT"
19550 IFOP$="H"THENIA$="63026 SC
REEN0"ELSEIA$=""
19575 IB$="63027 FORTI=1TO3000:N
EXT"
19580 SOUND234,1:FORDE=1TO50:NEX
T:SOUND234,1
19600 CLS:PRINT@72,"SUBROUTINE C
REATE":PRINT:PRINT
19610 PRINT"           tAPE OR dIS
K ?":PRINT:PRINT
19620 QU$=INKEY$:IFQU$=""THEN196
20
19630 IFQU$<>"T"ANDQU$<>"D"THEN1
9600
19640 IFQU$="T"THENDV=-1ELSEDV=1
19700 INPUT"FILENAME";FI$
19800 IF QU$="T"THENPRINT@233,"R
EADY RECORDER"ELSEPRINT@233,"REA
DY DISK DRIVE"
19900 PRINT@294,"<ANY KEY WHEN R
EADY>"
20000 Q$=INKEY$:IF Q$="" THEN 20
000
20100 OPEN"O",#DV,FI$
20200 FORH=1TO16
20300 PRINT#DV,DA$(H)
20400 IF QU$="T"THENPRINT@294,"
   WRITING TAPE      ":FORWT=1TO10
0:NEXT
20410 IFQU$="D"THENPRINT@294,"
  WRITING DISK      ":FORWT=1TO100
:NEXT
20500 PRINT@294,"
      "
20550 FORWT=1TO100:NEXT
20600 IFQU$="T"THENPRINT@294,"
  WRITING TAPE      "ELSEPRINT@294
,"    WRITING DISK     "
20700 NEXT
20800 PRINT#DV,I1$:PRINT#DV,I2$:
PRINT#DV,I3$:PRINT#DV,I4$:PRINT#
DV,I5$:PRINT#DV,I6$:PRINT#DV,I7$
:PRINT#DV,I8$:PRINT#DV,I9$:PRINT
#DV,IA$:PRINT#DV,IB$
20810 CLOSE#DV
20820 PRINT"WANT STORAGE CLEARED
 <Y/N>?"
20822 Q$=INKEY$:IF Q$="" THEN 20
822 ELSE SOUND222,1
20824 IFQ$="Y" THEN RUN
20900 CLS:GOTO1800
30000 FOR KK=1024TO1535
30100 VV=RND(125)
30200 POKE KK,VV+130
30300 NEXT
30400 FORDE=1TO1500:NEXT
30600 SOUND169,2:SOUND169,1
30710 SOUND169,1:PRINT@64,"    BL
OCK"
30720 SOUND169,1:PRINT@160," ":P
RINT@171,"GRAPHICS"
30730 SOUND169,2:PRINT@256," ":P
RINT@276,"GENERATOR"
30740 SOUND 169,1:PRINT@352," ":
PRINT@358,"BY - JIM SCHMIDT"
30750 PRINT@448,"         COPYRIGH
T (C) 1983 "
30795 FORDE=1TO1500:NEXT
30798 CLS
30800 RETURN
40000 QQ$=INKEY$:IFQQ$="R"THENRE
TURNELSE40000
```

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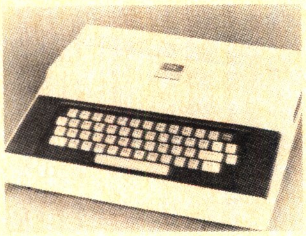

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The Art of Joystick Painting

By Brian Preble

Sketch is a color graphics editor for a 32K Color Computer with Extended BASIC and at least one joystick. It works in *PMODEs 3* and *4*.

Sketch contains all the normal commands used in most graphics editors such as *CIRCLE, LINE, BOX, DRAW, PAINT,* etc. It also has a feature that sets it apart from all other BASIC graphics editors I've seen. In most editors, if you choose a command you don't like, you must painstakingly erase the results and then redraw anything that was destroyed.

With *Sketch*, if you don't like something, press 'X' and the screen is restored to its original display. If you decide you like it, press the space bar and the screen will be updated. You *must* press the space bar to save a command! If you don't, the screen will be restored if you move the joystick or change modes.

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As captain of your ship, you must destroy the enemy bomber by spelling the mystery word. In this exciting and educational game the bomber gets closer with each inaccurate letter. You have only EIGHT tries to guess the mystery word or your ship will be bombed! If you guess the word correctly, GENERAL QUARTERS will sound and your ship will fire a missile to destroy the bomber, Three levels are available: EASY, MEDIUM, and HARD. Challenging for all ages!

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SPELLING BEE

The word is pronounced vocally and it is up to you to type in the correct spelling. If wrong, the computer will be your friend and flash the word on the screen for just an instant. OK! Try typing the word in again. STILL WRONG! The computer wants success and allows you to see the word again this time a little longer. If you just can't spell the word, the computer realizes you need to learn to spell the word and leaves the word on the screen for you to copy. Try your best and the computer has a surprise for your reward!

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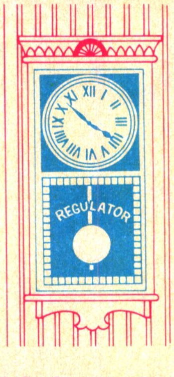

Torn between teaching time on a digital or a conventional (face and hands) clock? Well, this program combines the two using high resolution graphics and prompts! Your child will learn to tell time with the aid of a specially designed CLOCK! Child enters the time, if wrong, the center of the clock displays a graphic aid. If the child is correct a musical reward is heard. Program offers three levels: hours, quarter hours, and five minute intervals.

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How to use *Sketch*

Sketch is a simple program to use. To move the cursor, simply move the right joystick in the direction you want.

To choose a command, press the key for the command desired. These commands may be listed by pressing 'H' for help.

For a circle, move the cursor to the center of the circle and press 'C'. You may then move the joystick and a circle will be drawn with the cursor as a point on the circle. If you like it, press the space bar and it will be saved. If you don't, press 'X' to cancel it.

The other commands work in a similar manner. Move the cursor to the origin of the line, box, etc. Then press a key and move the joystick.

One exception to this rule is the WRITE command. This command allows you to type letters and other characters directly on the graphics screen. To use this command, move the cursor to the position of the first letter and press 'W'. You are now in the WRITE mode. Anything you type will be shown on the screen except lowercase. To erase what you wrote, press the DELETE key (left arrow). To save what you wrote, press ENTER. If your letters aren't in the right position, move the joystick and type again; there is no need to press DELETE.

Two especially useful commands are GET 'G' and PUT 'P'. Use GET to store an image in a buffer for use somewhere else in the picture or if it wasn't placed quite right. For example: You drew a picture of a house and later decided you wanted it somewhere else. You would have to move to one corner of the house or other object (give yourself some clear space) and press 'G'. Then move to the opposite corner. A box will form indicating the area you will be storing. When you have it all, press the space bar and it will be stored.

To put it somewhere else, press 'P' and a house will appear near the cursor. Move the joystick and the house or other object will move with it. Press the space bar when it is properly positioned or 'X' to erase it.

Bear in mind that the GET command only stores an object, it *does not* erase it. You must do that manually if you desire.

The LINE and RAY commands don't end until 'X' is pressed. These commands are similar to each other, but LINE continues from where the previous line left off and RAY always starts from the point where it was chosen.

The Menu

By far the most powerful command in *Sketch* is 'M'. This command brings up a menu screen from which all other commands are controlled. Displayed on the menu are a number of commands followed by various numbers. The meaning of the numbers will become clear when you use that particular command. To use a command, press the key shown in inverse video (green on black) for that command.

For example: If you want to change colors, press 'D' (for *Draw*). The screen will clear and the prompt *"FOREGROUND COLOR?"* will be displayed. Type in the desired color (0-3) and press ENTER. The prompt *"BACKGROUND COLOR?"* will appear. Answer that in the same manner.

MOVE is the rate of movement of the cursor. Its default is 1,1. The first number is the number of dots moved each time the joystick is moved left or right, and the second is the number of dots moved up or down. Thus, if MOVE was 2,3 the cursor would move two left or right and three up and down. In the draw or erase modes ("+", "-") this would result in dotted lines.

> ***"By far the most powerful command in* Sketch *is 'M'. This command brings up a menu screen from which all other commands are controlled."***

Pattern is a command that allows patterns of colors to be used instead of solid colors. For example, if you had a foreground pattern of 48 and drew a filled-in box (F) the box would show up as a series of vertical bars in *PMODE4*. If the foreground pattern was 1, the same box would show up in blue or red instead of the usual black or white. The range of patterns allowed is 0-255. Background pattern is used for clearing the screen.

Pattern is turned on by pressing 'A' and selecting your foreground and background patterns. It is turned off by setting the normal foreground and background colors as described above.

The SAVE and LOAD commands will save or load a picture from disk. To change them to tape, change Line 69 to:

```
69 INPUT"PRESS ENTER TO CONTINUE"X$:CSAVEMF$,1536,7679,
1536
```

And change Line 61 to:

```
61 SCREEN1:CLOADMF$
```

WRITE determines the size of the letters; 4 is normal, 8 is double, 12 is triple, and so on by fours.

Hi Speed Poke Problems

If your computer can't handle *POKE 65495,0* you will have to remove it from Lines 1, 43, 57, 61 and 69. By "can't handle," I mean the screen goes crazy. I *don't* mean that some keys don't respond. If you are one of the latter then simply press SHIFT with the offending key. This should do the trick.

How It Works

The main body of *Sketch* is contained in Lines 2 to 16. These lines read the joystick and keyboard. If the joystick is moved, the screen is restored and control is passed to the appropriate subroutine for the command chosen. If the joystick wasn't moved then the keyboard is read for a mode change, character to be typed, or a cancel/save command ('X' or space). If a key wasn't pressed then the cursor is blinked if necessary and control returns to the joystick checker; otherwise, control is passed to the appropriate subroutine as above.

The subroutine at Line 85 copies the display screen to the backup screen when the space bar is pressed, the program is first run, or SHIFT/CLEAR is pressed.

The subroutine at Line 84 copies the backup graphics screen to the display screen when 'X' is pressed, the joystick is moved, or the cursor blinks.

These routines are a little faster than a machine language routine would be due to the time that would be needed to call such a routine from BASIC and its lack of response to the high-speed poke.

Here's one last hint. The GET/PUT option "NOT" in the menu will not put the contents of the GET buffer on the screen; instead, it will reverse an area of the screen the same *size* as the GET buffer. That is, black becomes white, white becomes black, red becomes blue, etc.

I hope you enjoy this program.

		72	248
14	222	94	184
30	107	115	31
43	84	140	217
58	78	END	216

The listing:

```
1 POKE65495,0:CLS:PCLEAR8:PMODE4
,1:SCREEN1,1:GOSUB85:CX=128:CY=9
6:M=1:CH=.9:CS=1:CE=1:SX=1:SY=1:
PF=5:PB=5:S=4:DIML$(58):FORX=0TO
58:READL$(X):NEXT:C$="0+MCBFLRZW
-DGPJ\X;OT":O$="CDLMPQRSWGXA":CF
=5:CB=0:DIMG(1500):PO=4:COLORCF,
CB
2 X=JOYSTK(0):Y=JOYSTK(1)
3 A$=INKEY$:IFM=10THEN4ELSEIFA$=
" "THEN41ELSEIFA$="H"GOSUB84:GOT
O86ELSEIFA$="J"GOSUB38ELSEIFA$="
M"GOSUB84:GOTO46ELSEIFINSTR(C$,A
$)=0ORA$=""THEN4ELSEM=INSTR(C$,A
$):A$="":FL=0:GOSUB84
4 IFM<>1THENONM-1GOSUB17,84,18,2
0,22,24,24,26,43,27,28,30,32,38,
39,40,42,74,79
5 IFX>0ANDX<63ANDY>0ANDY<63ANDM<
>1THEN2
6 IFM<>2ANDM<>11GOSUB84
7 IFX=0THENCX=CX-SX
8 IFCX<0THENCX=255
9 IFX=63THENCX=CX+SX
10 IFCX>255THENCX=0
11 IFY=0THENCY=CY-SY
12 IFCY<0THENCY=191
13 IFY=63THENCY=CY+SY
14 IFCY>191THENCY=0
15 DRAW"BM"+STR$(CX)+","+STR$(CY
):IFM<>11ANDM<>10ANDM<>2THENIFPA
=1THENDRAW"BRRH2NDG2NHRF2NUE2"EL
SEIFPPOINT(CX+1,CY)=CF ANDPPOINT
(CX,CY+1)=CF THENDRAW"C=CB;BRRH2
NDG2NRF2NUE2C=CF;"ELSEDRAW"C=CF;
BRRH2NDG2NRF2NUE2"
16 GOTO2
17 IFFL=0GOSUB84:FL=1:PSET(CX,CY
):RETURNELSEPSET(CX,CY):RETURN
18 IFFL=0THENXE=CX:YE=CY:FL=1
19 CIRCLE(XE,YE),SQR((CX-XE)^2+(
CY-YE)^2),,CH,CS,CE:RETURN
20 IFFL=0THENXE=CX:YE=CY:FL=1
21 LINE(XE,YE)-(CX,CY),PSET,B:RE
TURN
22 IFFL=0THENXE=CX:YE=CY:FL=1
23 LINE(XE,YE)-(CX,CY),PSET,BF:R
ETURN
24 IFFL=0THENXE=CX:YE=CY:FL=1
25 LINE(XE,YE)-(CX,CY),PSET:RETU
RN
26 PAINT(CX,CY),,PB:RETURN
27 IFFL=0GOSUB84:FL=1:PRESET(CX,
CY):RETURNELSEPRESET(CX,CY):RETU
RN
28 IFFL=0THENXE=CX:YE=CY:FL=1
29 CR=SQR((CX-XE)^2+(CY-YE)^2):F
ORX9=0TOCR:CIRCLE(XE,YE),X9,CB,C
H,CS,CE:NEXT:CIRCLE(XE,YE),CR,CF
,CH,CS,CE:PAINT(XE,YE),PF,PB:RET
URN
30 IFFL=0THENXE=CX:YE=CY:FL=1
31 GET(XE,YE)-(CX,CY),G,G:LINE(X
E,YE)-(CX,CY),PSET,B:GX=ABS(XE-C
X):GY=ABS(YE-CY):RETURN
32 ONPO GOTO33,34,35,36,37:RETUR
N
33 PUT(CX,CY)-(CX+GX,CY+GY),G,PS
ET:RETURN
34 PUT(CX,CY)-(CX+GX,CY+GY),G,PR
ESET:RETURN
35 PUT(CX,CY)-(CX+GX,CY+GY),G,AN
D:RETURN
36 PUT(CX,CY)-(CX+GX,CY+GY),G,OR
:RETURN
37 PUT(CX,CY)-(CX+GX,CY+GY),G,NO
T:RETURN
38 POKE65494,0:CLS:GOSUB84:PRINT
"CURSOR IS AT"CX","CY:PRINT:INPU
T"JUMP CURSOR TO";CX,CY:POKE6549
5,0:SCREEN1:RETURN
39 PCLS:GOSUB85:CX=128:CY=96:M=1
:RETURN
40 GOSUB84:M=1:RETURN
41 IFM=1THEN2ELSEIFM=2ORM=11GOSU
B85:M=1:GOTO2ELSEGOSUB84:ONM-1GO
SUB17,1,18,20,22,24,24,26,43,27,
28,30,32,38,39,40,42,74,79:IFM=1
3GOSUB84:M=1:GOTO2ELSEGOSUB85:IF
M=7THENFL=0:GOTO2ELSEIFM=8THEN2E
LSEM=1:GOTO2
42 M=2:RETURN
43 POKE65494,0:DRAW"S=S;":IFA$="
"THENRETURNELSEIF(A$>"Z"ORA$<CHR
$(13)ORA$=CHR$(21))ANDA$<>CHR$(8
)THENRETURNELSEIFA$=CHR$(13)THEN
M=1:GOSUB85:POKE65495,0:RETURNEL
SEIFA$=CHR$(8)GOSUB84:M=1:POKE65
495,0:RETURNELSEDRAWL$(ASC(A$)-3
2)
44 IFS<>4THENDRAW"S4":RETURNELSE
DRAW"BL6"+L$(ASC(A$)-32)+"S4":RE
TURN
45 M$=STR$(SC):DRAW"BM0,12C1S8":
GOSUB43:SC=SC+P:M$=STR$(SC):DRAW
"BM0,12C3S8":GOSUB43:DRAW"C1":LI
NE(208,0)-(255,12),PSET,BF:DRAW"
BM210,12C4":M$=STR$(F):GOSUB43:R
ETURN
46 POKE65494,0:CLS:PRINT@13,"OPT
IONS":PRINT@45,"-------"
47 PRINT"  cIRCLE ="CH","CS","CE
```

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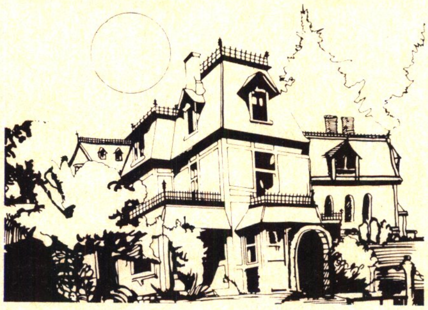

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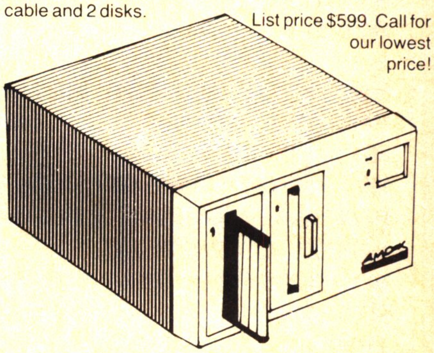

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```
48 PRINT"  dRAW   ="CF","CB
49 PRINT"  mOVE   ="SX","SY
50 PRINT"  pAINT  ="PF","PB
51 PRINT" PaTTERN =";:IFPA=0THEN
PRINT" OFF"ELSEPRINTTF","TB
52 PRINT"  wRITE  ="S
53 PRINT"  sAVE":PRINT"  lOAD":P
RINT"  qUIT"
54 PRINT"  rESOLUTION"
55 PRINT"  gET/PUT OPTION ="PO:P
RINT:PRINT"  ExIT TO SCREEN"
56 I$=INKEY$:IFINSTR(O$,I$)=0ORI
$=""THEN56ELSEI=INSTR(O$,I$)
57 IFI$="X"THENPOKE65495,0:SCREE
N1:GOTO2ELSECLS:ONI GOSUB58,59,6
0,63,64,65,66,68,71,72,,73:GOTO4
6
58 INPUT"CIRCLE HEIGHT";CH:INPUT
"CIRCLE START";CS:INPUT"CIRCLE E
ND";CE:RETURN
59 INPUT"FOREGROUND COLOR";CF:IN
PUT"BACKGROUND COLOR";CB:PA=0:CO
LORCF,CB:RETURN
60 CLS:PRINT@74,"LOAD PICTURE":P
RINT@224,;:LINEINPUT"FILENAME: "
;F$
61 SCREEN1:POKE65495,0:LOADMF$
62 GOSUB85:RETURN
63 INPUT"SPEED _,^";SX,SY:RETURN
64 INPUT"PAINT COLOR";PF:INPUT"B
ORDER COLOR";PB:RETURN
65 CLS:END
66 INPUT"RESOLUTION (3 OR 4)";R:
IFR=3THENPMODE3,1:SCREEN1,0ELSEI
FR=4THENPMODE4,1:SCREEN1,1ELSECL
S:GOTO66
67 GOTO46
68 CLS:PRINT@74,"SAVE PICTURE":P
RINT@224,;:LINEINPUT"FILENAME: "
;F$
69 POKE65495,0:SAVEMF$,3584,9727
,0
70 RETURN
71 INPUT"SIZE (4 IS NORMAL)";S:R
ETURN
72 INPUT"OPTION (1=PSET,2=PRESET
,3=AND,  4=OR,5=NOT)";PO:RETURN
73 INPUT"PATTERN (FOREGROUND, BA
CKGROUND)";TF,TB:PA=1:POKE178,TF
:POKE179,TB:RETURN
74 IFFL=0THENXE=CX:YE=CY:FL=1
75 RO=INT(SQR((CX-XE)^2+(CY-YE)^
2))
76 IFRO/3<>INT(RO/3)THENRO=RO+1:
GOTO76
77 RO=RO/3:IFRO>32THENRO=32
78 DRAW"BM"+STR$(XE)+","+STR$(YE
)+"C=CF;S=RO;BM+0,-6R2F4D4G4L4H4
U4E4R2BM+0,6S4":RETURN
79 IFFL=0THENXE=CX:YE=CY:FL=1
80 RO=INT(SQR((CX-XE)^2+(CY-YE)^
2))
81 IFRO/4<>INT(RO/4)THENRO=RO+1:
GOTO81
82 RO=RO/4:IFRO>32THENRO=32
83 DRAW"BM"+STR$(XE)+","+STR$(YE
)+"C=CF;S=RO;BM+0,-4F8L16E8BM+0,
4S4":RETURN
84 DRAW"S4":FORSC=1TO4:PCOPYSC+4
TOSC:NEXT:RETURN
85 DRAW"S4":FORSC=1TO4:PCOPYSC T
OSC+4:NEXT:RETURN
86 CLS:PRINTTAB(13)"HELP":PRINTS
TRING$(32,131);
87 PRINT"c=CIRCLE","+=DRAW"
88 PRINT"d=DISK","0=MOVE"
89 PRINT"b=BOX","-=ERASE"
90 PRINT"f=FILLED BOX","m=MENU"
91 PRINT"l=LINE","h=THIS HELP"
92 PRINT"r=RAY","j=JUMP"
93 PRINT"g=GET        <SHIFT-CLEAR
>=CLEAR"
94 PRINT"p=PUT","x=CANCEL"
95 PRINT"z=PAINT","<SPACE>=STORE
"
96 PRINT"o=OCTAGON","t=TRIANGLE"
97 PRINT"w=WRITE",CHR$(127)"=UNW
RITE"
98 PRINT"<ENTER>=STORE WRITE"
99 PRINT:PRINT"     USE THE JOYST
ICK TO MOVE";
100 IFINKEY$=""THEN100ELSESCREEN
1:GOTO2
101 FORI=0TO58:READL$(I):NEXT
102 DATA"BM+7,0
103 DATA"BM+2,1UBM+0,-2U5BM+5,7
104 DATA"BM+1,-4U2BM+2,0D2BM+4,4
105 DATA"BM+1,0U6BM+2,0D6BM-3,-4
R4BM-4,2R4BM+3,2
106 DATA"BM+4,-5L2NUND5L2D2R4D2L
4BM+7,1
107 DATA"UE4UBM-4,0DBM+4,4DBM+3,
0
108 DATA"BM+5,0NEH4UERFDGL2GDFR2
E2BM+2,2
109 DATA"BM+2,-5EBM+4,6
110 DATA"BM+3,0H2U2E2BM+4,6
111 DATA"BM+1,0E2U2H2BM+6,6
112 DATA"BM+3,-3NU2NR2ND2NL2NHNE
NFNGBM+4,3
113 DATA"BM+2,-1U2NU2NL2R2BM+3,3
114 DATA"BM+2,0NUGBM+6,-1
115 DATA"BM+0,-3R4BM+3,3
116 DATA"BM+2,0UBM+5,1
117 DATA"UE4UBM+3,6
118 DATA"BM+1,0HU4ER2FD4GL2BM+6,
0
119 DATA"BM+1,0RNRU6GBM+6,5
```

```
120 DATA"NR4UERE2UHL2GBM+7,5
121 DATA"BM+0,-1FR2EH2E2HL3BM+7,
6
122 DATA"BM+3,0U2NRL3UE3D3BM+4,3
123 DATA"BM+0,-1FR2EU2HL3U2R4BM+
3,6
124 DATA"BM+4,-5HL2GD4FR2EUHL3BM
+7,3
125 DATA"UE4UL4BM+7,6
126 DATA"BM+1,0HUEHUER2FDGNL2FDG
L2BM+6,0
127 DATA"BM+0,-1FR2EU4HL2GDFR2BM
+4,3
128 DATA"BM+2,-1UBM+0,-2UBM+5,5
129 DATA"BM+1,1EUBM+0,-2UBM+5,4
130 DATA"BM+4,0H3E3BM+3,6
131 DATA"BM+1,-2R3BM-3,-2R3BM+3,
4
132 DATA"BM+2,0E3H3BM+5,6
133 DATA"BM+1,-6ER2FDG2BM+0,2DBM
+4,0
134 DATA"BM+0,-3UER2D4LNH2R3EU3H
2L5G2D4F2R3BM+3,-1
135 DATA"U4E2F2D2NL4D2BM+3,0
136 DATA"U6R3FDGNL3FDGL3BM+7,0
137 DATA"BM+1,0HU4ER2FBM+0,4GL2B
M+6,0
138 DATA"U6R3FD4GL3BM+7,0
139 DATA"NR4U3NR2U3R4BM+3,6
140 DATA"U3NR2U3R4BM+3,6
141 DATA"BM+1,0HU4ER2FBM+0,2NL1D
2GL2BM+6,0
142 DATA"U3NU3R4NU3D3BM+3,0
143 DATA"BM+1,0RNRU6NLRBM+4,6
144 DATA"BM+0,-1FREU5NLRBM+3,6
145 DATA"U3NU3RNE3F3BM+3,0
146 DATA"NU6R4UBM+3,1
147 DATA"U6F2NDE2D6BM+3,0
148 DATA"U6FDF2DFNU6BM+3,0
149 DATA"BM+1,0HU4ER2FD4GL2BM+6,
0
150 DATA"U6R3FDGL3BM+7,3
151 DATA"BM+1,0HU4ER2FD3GNHNFGLB
M+6,0
152 DATA"U6R3FDGL2NLF3BM+3,0
153 DATA"BM+0,-1FR2EUHL2HUER2FBM
+3,5
154 DATA"BM+2,0U6NL2R2BM+3,6
155 DATA"BM+0,-1NU5FR2EU5BM+3,6
156 DATA"BM+0,-6D2FDFNDEUEU2BM+3
,6
157 DATA"NU6E2NUF2U6BM+3,6
158 DATA"UE4UBM-4,0DF4DBM+3,0
159 DATA"BM+0,-6D2F2ND2E2U2BM+3,
6
160 DATA"NR4UE4UL4BM+7,6
```

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Streamline competitive pairing and bracketing with . . .

The CoCo Tournament Programs

By Fred B. Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for a program that you would like to see written for the CoCo, submit it to "The Rainbow Wishing Well" c/o THE RAINBOW. *If an idea looks especially worthwhile and challenging, Fred might be able to write a program to do your task. Remember, this is* BASIC *so make your requests as specific as possible. All programs resulting from your suggestions are for your own use, but remain the property of the author.*

"The Rainbow Wishing Well" has been in full swing for several months now, and a number of varied fields have been covered, ranging from education to graphics to athletic applications. This month we offer a pair of line printer programs which will handle the creation of double elimination brackets for any kind of tournament competition, whether it be for basketball, wrestling, bridge, chess, or even something like a spelling bee. The time-consuming paperwork that goes along with such preparations can now be reduced to a minimum with the programs which you will find listed in these pages.

Let's take a look at some of the planning which can go into tournament preparations just so we can get some idea of how your CoCo can become a super time-saver at this task.

(Fred Scerbo is a special needs instructor for the North Adams Public Schools. He holds a master's in education and published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.)

Planning A Tournament

If you have been following "The Wishing Well" for the last few months, you will by now be familiar with the fact that I help coach a high school wrestling team. Even before I went to our first tournament, I was familiar with the type of pairing bracket which would be used for determining who faced whom for any given match. Just as you would find in any type of regular athletic pairing involving teams, even I knew that if you had eight teams, then team one faces team eight, team two faces team seven, team three faces six, and so on. This type of face-off is easy to figure because the team with the most wins ranks number one, and so on and so forth.

After sitting down at a pairing meeting for the Berkshire Hills Conference Christmas Tournament, I soon found out that things are not always so black and white when dealing with a tournament early in the season when team or individual records are not yet determined. In other words, it is not always so easy to determine who ranks first or second, or worse yet, who ranks eighth, thus getting the honor of being sacrificed to the number one team!

> ***"This month we offer a pair of line printer programs which will handle the creation of double elimination brackets for any kind of tournament competition . . ."***

This is not the only problem which

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- Faster to program in than Basic
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The MICRO WORKS COLOR FORTH is a Rompack containing everything you need to run Forth on your Color Computer. COLOR FORTH consists of the standard Forth Interest Group (FIG) implementation of the language plus most of FORTH-79. It has a super screen editor with split screen display. Mass storage is on cassette. COLOR FORTH also contains a decompiler and other aids for learning the inner workings of this fascinating language. It will run on 4K, 16K, and 32K computers. And COLOR FORTH contains 10K of ROM, leaving **your** RAM for **your** programs! There are simple words to effectively use the Hi-Res Color Computer graphics, joysticks, and sound.

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comes to mind when dealing with bracketing. Sure, if you have eight individuals or teams, you use an eight-person bracket. There is no big problem, but what happens when you have nine or 10, or only five or six? There are no five-person brackets for competition (unless we are dealing with a sport like freestyle wrestling, where no one is seeded number one and you face everyone in your category once. The final positions are determined by your total number of points for the day.).

It is here that I was introduced to the concept of the *bye*. To put it very simply, a bye is a free-ride, a chance to advance to the next level of the bracket without facing an opponent. If we are dealing with the type of competition where total accumulated points count, then a bye can hurt you. If we are using a bracket system as presented in these programs, a bye can be very helpful.

The nature of the bye thus poses us with a simple yet annoying problem. How do we decide who gets the bye? If it always were to go to the top seeds, then the top positions would become even more valuable resulting in even greater arguments at the pairings. Equally so, it makes no sense to assign the byes to your weakest competitors, since it would give them an unfair advantage over those who had earned the right to a higher position on the bracket.

Therefore, the only fair way to assign the byes are at *random*. (see where your CoCo comes in yet?) This is not as easy as it may sound. Let us say that we are dealing with 11 players. This would require that we use a 16-person bracket with five byes. Each of the 11 players (or teams) should have an equal shot at receiving one of the byes. At the same time, the byes must be equally divided between the top and bottom halves of the bracket. Not only that, you must make sure that you never have a bye facing a bye on your bracket. This would be foolish since no one would gain any advantage from this.

To get around this problem, I have been at pairing meetings where the individuals doing the pairings would have to resort to ripping up small pieces of paper and drawing lots to determine who gets the byes and where they go on the bracket. This often has to be done several times to insure that the byes do not face each other. This can consume a great deal of valuable time, especially if the pairings are being done at the same day as the competition.

Back To The Wishing Well

It only took one pairing meeting for me to realize that the CoCo could easily solve many of the problems involved in bracketing and pairing. The object of the programs would be:

1) Allow the user to enter the names of players or teams more quickly than they could be done by hand.

2) Give each player or team an equal shot at receiving the bye.

3) Insure that a bye never faces a bye.

4) Print out the entire bracket, advancing players/teams which receive byes and print the consolation bracket.

5) Allow score sheets or labels with the matched pairs to be printed from the single entry of data.

6) Print multiple copies of the same bracket.

> ***"I will let you in on a little secret. This program can also work on a Radio Shack Model 100 portable computer. All you have to do is change* PRINT#-2, *to* LPRINT *and alter the* PRINT@ *numbers to match the Model 100 screen."***

Goal number five is especially valuable since some type of score sheet has to be used, regardless of what kind of competition this is. This is an area where it is also easiest to make an error when doing the writing by hand. You do not want the wrong players facing each other. I was actually at a tournament where this happened because of a written error and, believe me, it can be a "real can of worms."

The two programs listed here are for eight and 16 positions. I have also written a 32-position bracket, but it is longer than both of these two combined. For those who would find the 32-position bracket useful, send a self-addressed stamped envelope to "The Wishing Well" c/o THE RAINBOW and I will send you details on how to get a copy of the listing.

You might be wondering why I just didn't list the 32-level bracket and let it be used for all numbers. This is because you do need an eight-bracket for up to eight or fewer positions, a 16-bracket for nine to 16, and a 32 for 17 to 32 positions. Since using a 32-level bracket is very rare in any type of competition, I felt the eight- and 16-level brackets would be more useful to the general public. (Besides, you can always use two 16-brackets by dividing your groups into two pools. Thus, the top finalists in each pool would face each other for first and second place while the top two second place finalists would face each other for third and fourth place, and so on.)

Another thing you will notice is that I have once again used *DATA* statements rather than *INPUT* for disk and tape files. Don't get me wrong. I don't want you to think I always use *DATA* statements (especially since this is not the most *user friendly* way to write programs for the general public). Instead, I like to have programs such as this contain the necessary information so you can get a better idea of what the program does and how it works after typing it in or loading it from RAINBOW ON TAPE. It shouldn't take too much work if you want to alter this program by changing the *READ* commands to *INPUT*. I usually prefer to use *DATA* at a tournament since someone has always given me an incorrect spelling of someone's name. This way, I can usually just *EDIT* the *DATA*.

One important thing to remember is that this program is virtually useless without a line printer capable of handling at least 80 characters per line. I have also included the *CHR$* commands to generate the condensed mode of 132 characters per line as found on the Okidata Microline 82A and 92A printers. If your printer uses different codes, consult your manual to change to the correct *CHR$* codes. The regular 80 characters per line should work on all standard CoCo line printers since all line printers recognize *CHR$(30)* as standard-sized print.

Now let's see what steps you can take to use this program for your own pairings.

Using The Program

All information for these programs begins at Line 1000. Therefore, your first two pieces of information in Line 1000 should be first, the number of actual participants in this bracket, and second, the number of names which will actually be seeded. Thus, Line 1000 should appear like this:

1000 DATA 6,3

Six is the number of participants. But, what do we mean by the "number seeded," which in this case is three? Well, in this case, it means that we have decided that out of the six names we have entered into *DATA*, only the first three have sufficient records to be ranked first, second, and third respectively. The remaining three can be ranked in any random order the computer chooses. (For example, in wrestling, these remaining three might be first year wrestlers who have no record of wins or losses yet, and therefore, cannot be logically ranked fourth, fifth and sixth by any criteria. Thus, they may even appear in the seventh of eighth positions depending on where the byes go.) Therefore, the group deciding the pairings would usually have ranked the first three positions and have left the remaining names to a random position.

If we had a 16-bracket, our numbers might be something like this: *1000 DATA 11,4,* which means we have 11 participants (with five byes) and only the first four listed will be ranked first through fourth. The remaining seven participants will end up seeded at random, with just as great a chance at receiving a bye as any other participant. We might have a circumstance where the numbers would be: *1000 DATA 16,16* which would mean 16 participants all ranked in the order listed with no byes.

The next *DATA* line reads:

1010 DATA JUNIORS,ASSORTED

The two strings here would indicate a category (JUNIOR wrestlers in this case) with a subname (ASSORTED) which could also be the weight class (145 POUNDS). You could put any pieces of information you wish for these two strings, especially if you are using this for something other than sports (say, bridge or chess).

The remaining *DATA* lines would have two pieces of information for each participant: NAME and AFFILIATION (such as school or town or whatever you choose).

That's all it takes. *RUN* the program and it will sort the names and byes. You will then be asked to press 'R' for regular print (80 characters per line) or 'S' for small (132 characters per line). If for some reason you do not like the arrangement, you can run the program again for a new sort, or you have the option of reprinting the same sheet, say, for the other coaches in the room.

Keep in mind, this program only does the pairing. It does not do any steps beyond that. It assumes you will fill in the following lines of the brackets as they proceed by hand. In any case, you have a very neat sheet to work with, done much more quickly than you could possibly do by hand.

After printing all your sheets, you also have the option of printing labels or names on score sheets that you may have already prepared. (This is helpful if your line printer uses single sheets as well as tractor feed paper.) The printing is designed to fit tractor feed labels set two to a sheet. If you misprint a label, you can either reprint it or go on to the next set of names. They will be paired left to right as they should be, such as position one with 16, two with 15, and so on.

There! All the hard work is done. Now you can get down to work on the competition.

I will let you in on a little secret. This program can also work on a Radio Shack Model 100 portable computer. (All you have to do is change *PRINT#-2,* to *LPRINT* and alter the *PRINT@* numbers to match the Model 100 screen. You may also need to change the random number generator. For some reason I had to on mine although the Model 100 handbook did not seem to indicate that this was necessary.) In fact, I usually use my pairing program with a Model 100 which I am starting to like as much as the CoCo. If you haven't tried the Model 100, give it a try. It is the perfect companion to the CoCo since with the use of a null modem (which you can make for about $8) and a terminal program you can dump back and forth between the two machines with the greatest of ease. (I can even use the CoCo disk drive to store my Model 100 programs in this very way, rather than spending another $800 on the Model 100 disk drive system.)

If you ever need to bracket, these programs will do it for you. As I mentioned earlier, if you need the 32-position bracket, drop me a line and a SASE for details. I also have the freestyle bracket available for wrestling, but since that is too specific in its use, it would not be wise to list it in "The Wishing Well" since so few of you could use it. At least these programs have other uses besides sports.

Next month, watch for something very, very different. I have a really different type of wish to grant which most of you should find very useful.

178	10	324	38
228	55	368	73
266	34	404	198
296	138	END	125

Listing 1:

```
10 REM***************************
20 REM*  PAIRING PROGRAM FOR    *
30 REM*     EIGHT POSITIONS     *
40 REM*   BY FRED B. SCERBO     *
50 REM*     149 BARBOUR ST.     *
60 REM* NORTH ADAMS, MA 01247 *
70 REM*  COPYRIGHT (C)  1984  *
80 REM************************
90 CLS
100 PRINT@101,"EIGHT POSITION PA
IRING"
110 PRINT:PRINTTAB(15)"BY"
120 PRINT:PRINTTAB(9)"FRED B. SC
ERBO"
130 PRINT:PRINTTAB(7)"COPYRIGHT
(C) 1984"
140 PRINT:PRINT" PRESS <ENTER> T
O BEGIN SORTING"
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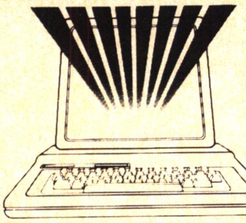

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Rainbow, Feb. '84 *"If you are looking for a program to keep track of your sales and print invoices, then this one will take care of those needs quite well...A good program that would serve the invoicing needs of a small company quite nicely."*

The Mark Data Products sales order processing system provides a fast, efficient means to enter orders, print shipping papers and invoices, prepare sales reports, and monitor receivables. The system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer and one or more disc drives.

The MDP Order Entry System is a family of programs which operate interactively by means of a "menu" selection scheme. Up to 900 products may be defined and a single disc system can hold over 600 transactions. When the operator selects a task to be performed, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary paperwork including shipping and invoice forms, daily sales reports, a monthly (or other period) sales report and a receivables report.

This order entry software equals or exceeds higher priced packages for other computers and includes a detailed operating manual. **ONLY $99.95**

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Rainbow, May '84 *"Considering what it can do to organize a small business, it is quite a value."*

Hot CoCo, June '84 *"...a serious, professional accounting program and well worth its price. The programs are complete and simple to use."*

The Mark Data Products Accounting System is ideal for the small businessman needing a fast, efficient means to process income and expenses, prepare detailed reports and maintain most of the information required at tax time. The system is a family of programs which operate by means of a "menu" selection scheme. When the operator selects a task to perform, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary accounting reports including a transaction journal, a P & L or income report, an interim or trial balance and a balance sheet.

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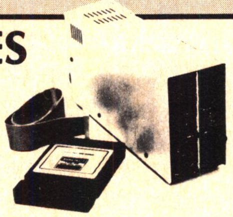

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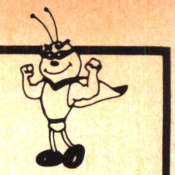

Mark Data Products **SUPER BUG** is a powerful, relocatable machine code monitor program for your CoCo. If you are a beginner, the program and documentation are an indispensable training aid, helping you to gain a better understanding of your Color Computer and machine code programming. If you are an accomplished computerist, **SUPER BUG**'s capabilities, versatility and convenience will prove invaluable during programming and debugging.

SUPER BUG offers so many outstanding features that we are unable to list them all in this limited space, but here are a few: hex and alpha numeric memory display, modify, search, and test; full printer support with baud rate and line feed select; up to 220 breakpoints; mini object code disassembler; 64K mode setup; decimal, hex and asci code conversion routines and extensive documentation.

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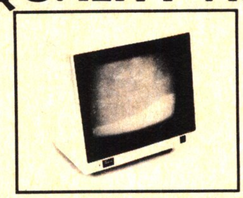
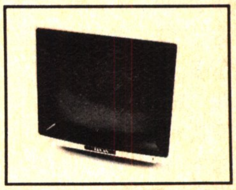


SAKATA COLOR SC-100 - $289.95

The SC-100 is a streamlined 13" composite monitor which produces sharp, brilliant colors. The cabinet is made of durable styrene and is available in an attractive off-white color. Includes audio with speaker and earphone jack. We highly recommend this color monitor because of its excellent performance and beautiful styling.



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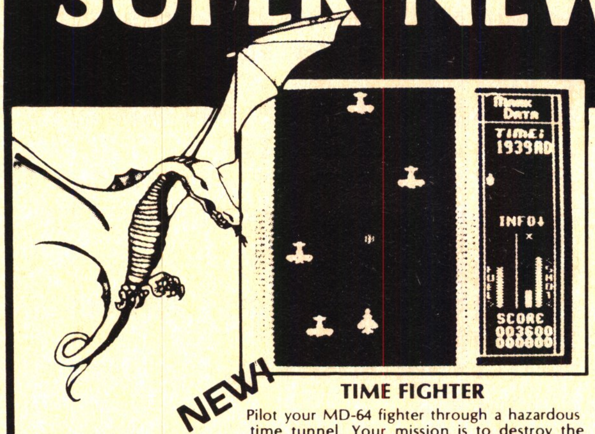

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TIME FIGHTER

Pilot your MD-64 fighter through a hazardous time tunnel. Your mission is to destroy the dreaded Time Guardian who threatens the natural order of the universe. In order to reach this menace you must fight aerial dangers from strange and different time zones. If you like fast action, this one's for you! 16K required.

Rainbow, March '84 *"One of the best in your library of computer games. It's a real gem."*

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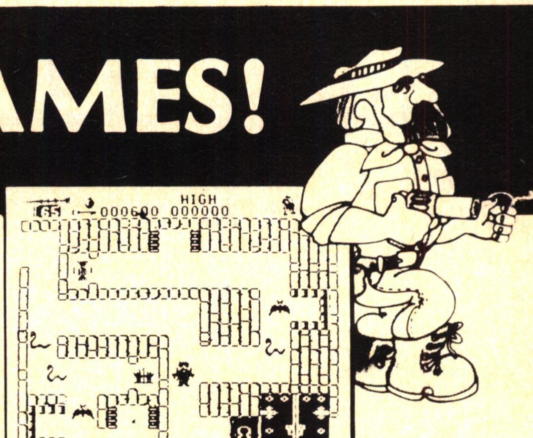

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Hot CoCo, April '84 *"State of the art CoCo graphics. A first rate game."*

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```
150 X$=INKEY$:RS=RND(-TIMER):IFX
$=CHR$(13)THEN160ELSE150
160 REM START SORT
170 CLEAR1000
172 BYE$=CHR$(95)+CHR$(95)+"BYE"
+CHR$(95)+CHR$(95)
174 CLS:PRINT@128,STRING$(32,"*"
):PRINTTAB(8)"NOW SORTING NAMES"
:PRINT:PRINTSTRING$(32,"*")
176 DIM TB(8,2),BB(8,2),PL$(16),
SC$(16),PR$(16),PF$(16),SB(16):L
L$=CHR$(95)
178 FORI=1TO4:READ TB(I,1):NEXT
180 DATA 1,8,5,4
182 FORI=1TO4:READ BB(I,1):NEXT
184 DATA 3,6,7,2
186 READ NW,CF,DV$,W$:NB=8-NW
188 FOR I=1TOCF:READ PL$(I),SC$(
I):NEXT:MU=NW-CF:IF MU=0 THEN196
 ELSE FORI=1TO MU
190 FT=RND(MU):IF SB(FT+CF)=1 TH
EN 190
192 SB(FT+CF)=1:READ PL$(FT+CF),
SC$(FT+CF):NEXTI
194 FORI=1TO NW:NEXT
196 FORI=1 TO CF
198 FOR Y=1TO4
200 IF TB(Y,1)=I THEN TB(Y,2)=2
202 IF BB(Y,1)=I THEN BB(Y,2)=2
204 NEXTY,I
206 U=1:IF NB=0 THEN 246
208 FOR I=1 TO NB
210 K=RND(4)
212 IF U=0 THEN 228
214 IF TB(K,2)=>1 THEN 210
216 WW=INT(K/2):WW=WW*2:IF K-WW=
1 THEN 222
218 IF TB(K-1,2)=1 THEN 210
220 GOTO224
222 IF TB(K+1,2)=1 THEN 210
224 TB(K,2)=1
226 U=0:GOTO242
228 IF BB(K,2)=>1 THEN 210
230 WW=INT(K/2):WW=WW*2:IF K-WW=
1 THEN 236
232 IF BB(K-1,2)=1 THEN 210
234 GOTO238
236 IF BB(K+1,2)=1 THEN 210
238 BB(K,2)=1
240 U=1:GOTO242
242 NEXT I
244 Q=CF+1
246 FOR I=1 TO 4
248 IF TB(I,2)=2 THEN PR$(TB(I,1
))=PL$(TB(I,1)):PF$(TB(I,1))=SC$
(TB(I,1))
250 IF TB(I,2)=1 THEN PR$(TB(I,1
))="..BYE..":PF$(TB(I,1))=""
252 IF TB(I,2)=0 THEN PR$(TB(I,1
))=PL$(Q):PF$(TB(I,1))=SC$(Q):Q=
Q+1
254 NEXT I
256 FOR I=1 TO 4
258 IF BB(I,2)=2 THEN PR$(BB(I,1
))=PL$(BB(I,1)):PF$(BB(I,1))=SC$
(BB(I,1))
260 IF BB(I,2)=1 THEN PR$(BB(I,1
))="..BYE..":PF$(BB(I,1))=""
262 IF BB(I,2)=0 THEN PR$(BB(I,1
))=PL$(Q):PF$(BB(I,1))=SC$(Q):Q=
Q+1
264 NEXT I:GOTO270
266 FORI=1TO8:PRINT#-2,I,PR$(TB(
I,1)):NEXTI
268 FORI=1TO8:PRINT#-2,I+8,PR$(B
B(I,1)):NEXTI
270 FORI=1TO4:IF PR$(I)="..BYE..
"THENSS$(I)=PR$(9-I)ELSEIF PR$(9
-I)="..BYE.."THENSS$(I)=PR$(I)EL
SESS$(I)=""
272 NEXT
274 CLS:PRINT@128,STRING$(32,"*"
):PRINT:PRINT"PRESS <R>EGULAR OR
 <S>MALL PRINT":PRINT:PRINTSTRIN
G$(32,"*")
```

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```
276 X$=INKEY$:IFX$="S"THEN278ELS
EIFX$="R"THEN284ELSE276
278 X=4:L$=STRING$(20,95):SP$=ST
RING$(20,32):V$=CHR$(124):ES$=ST
RING$(41,32):Q=4:HJ=8:PRINT#-2,C
HR$(29):FL$=STRING$(24,95)
280 FR$=" (FIRST PLACE)":PP=20:H
S$=STRING$(10,3):HL$=L$:A=1:B=12
:C=32:D=53:E=74:F=95:G=118
282 GOTO288
284 X=4:L$=STRING$(16,95):SP$=ST
RING$(16,32):V$=CHR$(124):ES$=ST
RING$(33,32):Q=0:HJ=0:FL$=STRING
$(8,95):FR$="(FIRST)"
286 PRINT#-2,CHR$(30):PP=16:HS$=
STRING$(8,32):HL$=STRING$(8,95):
A=1:B=4:C=20:D=37:E=54:F=63:G=74
288 IF FP=1THEN292
290 FORI=1TO8:QP=LEN(PR$(I)):PR$
(I)=PR$(I)+STRING$(PP-QP,95):NEX
TI
292 REM START PRINTING
294 PRINT#-2,TAB(X+26+Q*3)DV$" -
 "W$:PRINT#-2," ":PRINT#-2," 1.
"TAB(B)PR$(1)TAB(E+3+HJ*2)"1ST "
L$
296 PRINT#-2,TAB(C)V$" "SS$(1)
298 PRINT#-2,TAB(C)V$L$TAB(E+3+H
J*2)"2ND "L$
300 PRINT#-2," 8. "TAB(B)PR$(8)V
$TAB(D)V$
302 PRINT#-2,TAB(D)V$TAB(E+3+HJ*
2)"3RD "L$
304 PRINT#-2,TAB(D-1)"X"V$L$
306 PRINT#-2," 5. "TAB(B)PR$(5)T
AB(D)V$TAB(E)V$TAB(E+3+HJ*2)"4TH
 "L$
308 PRINT#-2,TAB(C)V$" "SS$(4)TA
B(D)V$TAB(E)V$
310 PRINT#-2,TAB(C)V$L$V$TAB(E)V
$TAB(E+3+HJ*2)"5TH "L$
312 PRINT#-2," 4. "TAB(B)PR$(4)T
AB(C)V$TAB(E)V$
314 PRINT#-2,TAB(E)V$
316 PRINT#-2,TAB(E)V$
318 PRINT#-2," 3. "TAB(B)PR$(3)T
AB(E)V$HL$
320 PRINT#-2,TAB(C)V$" "SS$(3)TA
B(E)V$" "FR$
322 PRINT#-2,TAB(C)V$L$TAB(E)V$
324 PRINT#-2," 6."TAB(B)PR$(6)V$
TAB(D)V$TAB(E)V$
326 PRINT#-2,TAB(D)V$TAB(E)V$
328 PRINT#-2,TAB(D-1)"Y"V$L$V$
330 PRINT#-2," 7. "TAB(B)PR$(7)T
AB(D)V$
332 PRINT#-2,TAB(C)V$" "SS$(2)TA
B(D)V$
334 PRINT#-2,TAB(C)V$L$V$
336 PRINT#-2," 2. "TAB(B)PR$(2)V
$
338 PRINT#-2," "
340 PRINT#-2," "
342 IFX$="S"THEN344ELSEIFX$="R"T
HEN346ELSE342
344 L$=STRING$(20,95):SP$=STRING
$(20,32):V$=CHR$(124):ES$=STRING
$(41,32):Z=8:Q=4:HJ=8:PRINT#-2,C
HR$(29):FL$=STRING$(13,95):FR$="
 (THIRD PLACE)":GOTO348
346 L$=STRING$(12,95):SP$=STRING
$(12,32):V$=CHR$(124):ES$=STRING
$(25,32):Q=0:HJ=-8:FL$=STRING$(9
,95):FR$=" (THIRD)":Z=0:PRINT#-2
,CHR$(30)
348 REM CONS.BRACKET
350 PRINT#-2,TAB(X+26+Q*3)"CONSO
LATION BRACKET":PRINT#-2," "
352 PRINT#-2," "
354 PRINT#-2,TAB(X)L$
356 PRINT#-2,TAB(X)SP$V$
358 PRINT#-2,TAB(X)SP$V$L$
360 PRINT#-2,TAB(X)L$V$SP$V$L$
362 PRINT#-2,TAB(X+25+Q*2+Z)V$SP
$V$
```

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Name ____________

Address ____________

City ____________ State/Zip ______

Signature ____________ Phone ______

```
364 PRINT#-2,TAB(X+Z)"     LOSER
 Y "L$V$SP$V$
366 PRINT#-2,TAB(X)ES$" "SP$V$L$
LL$
368 PRINT#-2,TAB(X)L$SP$"  "SP$V
$" (THIRD)"
370 PRINT#-2,TAB(X)SP$V$TAB(34+X
+HJ)SP$V$
372 PRINT#-2,TAB(X)SP$V$L$SP$" "
V$
374 PRINT#-2,TAB(X)L$V$SP$V$L$V$
376 PRINT#-2,TAB(X+25+Q*2+Z)V$
378 PRINT#-2,TAB(X+Z)"     LOSER
 X "L$V$
380 CLS0:PRINT@224," PRESS <ENTE
R> FOR BOUT SHEETS.":PRINT" PRES
S <A> FOR ANOTHER BRACKET."
382 X$=INKEY$:IFX$=CHR$(13)THEN3
84ELSEIFX$="A"THEN274ELSE382
384 SN=1:FORQ=1TO4
386 BP$(1)=PR$(Q):BP$(2)=PR$(9-Q
)
388 FR$(1)=PF$(Q):FR$(2)=PF$(9-Q
)
390 R=Q:U=9-Q
392 GOSUB408
394 GOSUB400
396 NEXTQ
398 GOTO380
400 CLS0:PRINT@256," (R)EPEAT CO
PY OR (N)EXT SHEET ?";
402 FOR QJ=1TO4:PRINT#-2," ":NEX
TQJ
404 X$=INKEY$:IFX$="R"THENGOSUB4
08 ELSE IFX$="N"THEN RETURN ELSE
 404
406 GOTO400
408 PRINT#-2,CHR$(30);TAB(10)"CO
LOR"STRING$(15,95)TAB(53)"COLOR"
STRING$(15,95)
410 PRINT#-2,TAB(2);:PRINT#-2,US
ING"###.";R+VJ;:PRINT#-2,TAB(45)
;:PRINT#-2,USING"###.";U+VJ
412 PRINT#-2,TAB(10)"NAME: ";BP$
(1);TAB(53);BP$(2)
414 PRINT#-2,"DRAW NO.  FROM: "F
R$(1);TAB(43)"DRAW NO.  FROM: "F
R$(2)
416 FOR RP=1TO2:PRINT#-2,"SESSIO
N: "SN;" CAT: ";W$;TAB(43);:NEXT
RP
418 RETURN
990 REM FIRST NUMBER IS TOTAL #
OF PARTICIPANTS - SECOND NUMBER
IS THE NUMBER RANKED
1000 DATA 6,3
1005 REM ENTER GROUP,CATEGORY
1010 DATA JUNIORS,ASSORTED
1015 REM ENTER NAME,AFFILIATION
1020 DATA ANDY POTVIN,DRURY
1030 DATA DAVID LANOUE,MT.EVERET
1040 DATA DAN TROMBLEY,DRURY
1050 DATA KEVIN TASSONE,DRURY
1060 DATA SEAN HOHMAN,MT.EVERET
1070 DATA MIKE BEAUDRY,DRURY
```

174	49	364	62
220	30	398	218
262	139	430	20
296	97	490	184
324	64	END	182

Listing 2:

```
10 REM***************************
20 REM*  PAIRING PROGRAM FOR    *
30 REM*   SIXTEEN POSITIONS     *
40 REM*   BY FRED B. SCERBO     *
50 REM*     149 BARBOUR ST.     *
60 REM* NORTH ADAMS, MA 01247 *
70 REM*  COPYRIGHT (C)  1984    *
80 REM***************************
82 REM
84 REM THIS PROGRAM USES 8 1/2 X
 11 INCH PAPER
86 REM IF USING 8 1/2 X 14 PAPER
 SEE LINE 296 & DELETE IT
```

BASIC COMPILER

Create Machine Language Programs from Basic Programs

Thats right, with this powerful integer Compiler, called INTBASIC, one can translate Basic programs to Machine Language. Those who do not want to learn Assembly Language can use this utility program to create those fast machine language programs every ambitious programmer dreams of creating. Even fully compitant Assembly Language programmers will find INTBASIC a very valuable utility. INTBASIC was designed specifically to produce efficient 6809 machine code by utilizing the powerful instruction set available.

INTBASIC, developed by WASATCHWARE, features all standard Basic command words including two-dimensional arrays, multiple commands per line and strings. In addition, INTBASIC offers commands that are not available with Color or Extended Color Basic. All 64k of RAM can be used for program storage and/or variable storage, and all 32k of ROM can be accessed within the m.l. program. Compiled programs can be called from a Basic program, thus making interfacing easy.

INTBASIC has many features that some of the lower priced Basic Compilers can't offer. Here are just some of them:

-No Disk system is required, although it can run from disk
-Extended Color Basic is NOT required
-Enables the full 64k of RAM to be used
-16k machines can run INTBASIC

In addition, INTBASIC is written in Machine language, not Basic. This means that compile times are very short. How short? INTBASIC can compile a 10 thousand byte Machine Language program in as little as 30 seconds!

Some other reasons to buy INTBASIC

-By converting Basic programs to machine language, program execution times are decreased by a factor of 50!

-Machine Language programs can perform many things that a Basic program cannot do. Unlimited possibilities exist when using machine language.

-Variable storage is efficiently allocated, and therefore large arrays may be used. For example, the integer array A(30000) is allowable on 64k machines.

-More than one program can reside in memory at once. As apposed to Basic which only allows one program at a time in the computer.

-System utility software can be easily developed using INTBASIC.

-Machine language programs that take pages and pages of Assembly Language source to create, can be created with less than a page of a comparable Basic source, when compiled with INTBASIC.

-Versions for 16,32 and 64k computers are all included for the same low price.

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```
90 CLS
100 PRINT@100,"SIXTEEN POSITION
PAIRING"
110 PRINT:PRINTTAB(15)"BY"
120 PRINT:PRINTTAB(9)"FRED B. SC
ERBO"
130 PRINT:PRINTTAB(7)"COPYRIGHT
(C) 1984"
140 PRINT:PRINT" PRESS <ENTER> T
O BEGIN SORTING"
150 X$=INKEY$:RS=RND(-TIMER):IFX
$=CHR$(13)THEN160ELSE150
160 REM START SORT
170 CLEAR1000
172 BYE$=CHR$(95)+CHR$(95)+"BYE"
+CHR$(95)+CHR$(95)
174 CLS:PRINT@128,STRING$(32,"*"
):PRINTTAB(8)"NOW SORTING NAMES"
:PRINT:PRINTSTRING$(32,"*")
176 DIM TB(8,2),BB(8,2),PL$(16),
SC$(16),PR$(16),PF$(16),SB(16):L
L$=CHR$(95)
178 FORI=1TO8:READ TB(I,1):NEXT
180 DATA 1,16,8,9,5,12,13,4
182 FORI=1TO8:READ BB(I,1):NEXT
184 DATA 3,14,6,11,7,10,15,2
186 READ NW,CF,DV$,W$:NB=16-NW
188 FOR I=1TOCF:READ PL$(I),SC$(
I):NEXT:MU=NW-CF:IF MU=0 THEN196
 ELSE FORI=1TO MU
190 FT=RND(MU):IF SB(FT+CF)=1 TH
EN 190
192 SB(FT+CF)=1:READ PL$(FT+CF),
SC$(FT+CF):NEXTI
194 FORI=1TO NW:NEXT
196 FORI=1 TO CF
198 FOR Y=1TO8
200 IF TB(Y,1)=I THEN TB(Y,2)=2
202 IF BB(Y,1)=I THEN BB(Y,2)=2
204 NEXTY,I
206 U=1:IF NB=0 THEN 246
208 FOR I=1 TO NB
210 K=RND(8)
212 IF U=0 THEN 228
214 IF TB(K,2)=>1 THEN 210
216 WW=INT(K/2):WW=WW*2:IF K-WW=
1 THEN 222
218 IF TB(K-1,2)=1 THEN 210
220 GOTO224
222 IF TB(K+1,2)=1 THEN 210
224 TB(K,2)=1
226 U=0:GOTO242
228 IF BB(K,2)=>1 THEN 210
230 WW=INT(K/2):WW=WW*2:IF K-WW=
1 THEN 236
232 IF BB(K-1,2)=1 THEN 210
234 GOTO238
236 IF BB(K+1,2)=1 THEN 210
238 BB(K,2)=1
240 U=1:GOTO242
242 NEXT I
244 Q=CF+1
246 FOR I=1 TO 8
248 IF TB(I,2)=2 THEN PR$(TB(I,1
))=PL$(TB(I,1)):PF$(TB(I,1))=SC$
(TB(I,1))
250 IF TB(I,2)=1 THEN PR$(TB(I,1
))=BYE$:PF$(TB(I,1))=""
252 IF TB(I,2)=0 THEN PR$(TB(I,1
))=PL$(Q):PF$(TB(I,1))=SC$(Q):Q=
Q+1
254 NEXT I
256 FOR I=1 TO 8
258 IF BB(I,2)=2 THEN PR$(BB(I,1
))=PL$(BB(I,1)):PF$(BB(I,1))=SC$
(BB(I,1))
260 IF BB(I,2)=1 THEN PR$(BB(I,1
))=BYE$:PF$(BB(I,1))=""
262 IF BB(I,2)=0 THEN PR$(BB(I,1
))=PL$(Q):PF$(BB(I,1))=SC$(Q):Q=
Q+1
264 NEXT I:GOTO270
270 FORI=1TO8:IF PR$(I)=BYE$ THE
NSS$(I)=PR$(17-I)ELSEIF PR$(17-I
)=BYE$ THENSS$(I)=PR$(I)ELSESS$(
```

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```
I)=""
272 NEXT
278 CLS:PRINT@128,STRING$(32,"*"
):PRINT:PRINT"PRESS <R>EGULAR OR
 <S>MALL PRINT":PRINT:PRINTSTRIN
G$(32,"*")
280 X$=INKEY$:IFX$="S"THEN282ELS
EIFX$="R"THEN288ELSE280
282 X=4:L$=STRING$(20,95):SP$=ST
RING$(20,32):V$=CHR$(124):ES$=ST
RING$(41,32):Q=4:HJ=8:PRINT#-2,C
HR$(29):FL$=STRING$(24,95):FR$="
 (FIRST PLACE)":PP=20:HS$=STRING
$(10,32):HL$=L$
284 A=1:B=12:C=32:D=53:E=74:F=95
:G=118
286 GOTO292
288 X=4:L$=STRING$(16,95):SP$=ST
RING$(16,32):V$=CHR$(124):ES$=ST
RING$(33,32):Q=0:HJ=0:FL$=STRING
$(8,95):FR$="(FIRST)":PRINT#-2,C
HR$(30):PP=16:HS$=STRING$(8,32):
HL$=STRING$(8,95)
290 A=1:B=4:C=20:D=37:E=54:F=63:
G=74
292 IF FP=1THEN296
294 FORI=1TO16:QP=LEN(PR$(I)):PR
$(I)=PR$(I)+STRING$(PP-QP,95):NE
XTI
296 PRINT#-2,CHR$(27)CHR$(56):
REM DELETE THIS LINE IF YOUR
LINEPRINTER DOES NOT CONDENSE
PRINT VERTICALLY - THEN YOU MUST
USE 8 1/2 X 14 INCH PAPER
298 PRINT#-2,TAB(X+26+Q*3)DV$" -
 "W$:PRINT#-2," ":PRINT#-2," 1.
"TAB(B)PR$(1)TAB(E+3+HJ*2)"1ST "
L$
300 PRINT#-2,TAB(C)V$" "SS$(1)
302 PRINT#-2,TAB(C)V$L$TAB(E+3+H
J*2)"2ND "L$
304 PRINT#-2,"16. "TAB(B)PR$(16)
V$TAB(D)V$
306 PRINT#-2,TAB(D)V$TAB(E+3+HJ*
2)"3RD "L$
308 PRINT#-2,TAB(D-1)"A"V$L$
310 PRINT#-2," 8. "TAB(B)PR$(8)T
AB(D)V$TAB(E)V$TAB(E+3+HJ*2)"4TH
 "L$
312 PRINT#-2,TAB(C)V$" "SS$(8)TA
B(D)V$TAB(E)V$
314 PRINT#-2,TAB(C)V$L$V$TAB(E)V
$TAB(E+3+HJ*2)"5TH "L$
316 PRINT#-2," 9. "TAB(B)PR$(9)T
AB(C)V$TAB(E)V$
318 PRINT#-2,TAB(E)V$
320 PRINT#-2,TAB(E)V$
322 PRINT#-2," 5. "TAB(B)PR$(5)T
AB(E-1)"E"V$HL$
324 PRINT#-2,TAB(C)V$" "SS$(5)TA
B(E)V$TAB(F)V$
326 PRINT#-2,TAB(C)V$L$TAB(E)V$T
AB(F)V$
328 PRINT#-2,"12."TAB(B)PR$(12)V
$TAB(D)V$TAB(E)V$TAB(F)V$
330 PRINT#-2,TAB(D)V$TAB(E)V$TAB
(F)V$
332 PRINT#-2,TAB(D-1)"B"V$L$V$TA
B(F)V$
334 PRINT#-2,"13. "TAB(B)PR$(13)
TAB(D)V$TAB(F)V$
336 PRINT#-2,TAB(C)V$" "SS$(4)TA
B(D)V$TAB(F)V$
338 PRINT#-2,TAB(C)V$L$V$TAB(F)V
$
340 PRINT#-2," 4. "TAB(B)PR$(4)V
$TAB(F)V$
342 PRINT#-2,TAB(F)V$HL$CHR$(95)
CHR$(95)CHR$(95)CHR$(95)CHR$(95)
344 PRINT#-2,TAB(F)V$" (FIRST PL
ACE)"
346 PRINT#-2,TAB(F)V$
348 PRINT#-2," 3. "TAB(B)PR$(3)T
AB(F)V$
350 PRINT#-2,TAB(C)V$" "SS$(3)TA
```

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```
B(F)V$
352 PRINT#-2,TAB(C)V$L$TAB(F)V$
354 PRINT#-2,"14. "TAB(B)PR$(14)
V$TAB(D)V$TAB(F)V$
356 PRINT#-2,TAB(D)V$TAB(F)V$
358 PRINT#-2,TAB(D-1)"C"V$L$TAB(
F)V$
360 PRINT#-2," 6. "TAB(B)PR$(6)T
AB(D)V$TAB(E)V$TAB(F)V$
362 PRINT#-2,TAB(C)V$" "SS$(6)TA
B(D)V$TAB(E)V$TAB(F)V$
364 PRINT#-2,TAB(C)V$L$V$TAB(E)V
$TAB(F)V$
366 PRINT#-2,"11. "TAB(B)PR$(11)
TAB(C)V$TAB(E)V$TAB(F)V$
368 PRINT#-2,TAB(E-1)"F"V$HL$TAB
(F)V$
370 PRINT#-2,TAB(E)V$
372 PRINT#-2," 7. "TAB(B)PR$(7)T
AB(E)V$
374 PRINT#-2,TAB(C)V$" "SS$(7)TA
B(E)V$
376 PRINT#-2,TAB(C)V$L$TAB(E)V$
378 PRINT#-2,"10. "TAB(B)PR$(10)
V$TAB(D)V$TAB(E)V$
380 PRINT#-2,TAB(D)V$TAB(E)V$
382 PRINT#-2,TAB(D-1)"D"V$L$V$
384 PRINT#-2,"15. "TAB(B)PR$(15)
TAB(D)V$
386 PRINT#-2,TAB(C)V$" "SS$(2)TA
B(D)V$
388 PRINT#-2,TAB(C)V$L$V$
390 PRINT#-2," 2. "TAB(B)PR$(2)T
AB(C)V$
392 PRINT#-2," "
394 IFX$="S"THEN396ELSEIFX$="R"T
HEN398ELSE394
396 L$=STRING$(20,95):SP$=STRING
$(20,32):V$=CHR$(124):ES$=STRING
$(41,32):Z=8:Q=4:HJ=8:PRINT#-2,C
HR$(29):FL$=STRING$(13,95):FR$="
 (THIRD PLACE)":GOTO400
398 L$=STRING$(12,95):SP$=STRING
$(12,32):V$=CHR$(124):ES$=STRING
$(25,32):Q=0:HJ=-8:FL$=STRING$(9
,95):FR$=" (THIRD)":Z=0:PRINT#-2
,CHR$(30)
400 REM CONS.BRACKET
402 PRINT#-2,TAB(X+26+Q*3)"CONSO
LATION BRACKET":PRINT#-2," "
404 PRINT#-2,TAB(43+X+Q*6)"LOSER
 G "L$
406 PRINT#-2,TAB(X)L$TAB(43+X+Q*
6)"           "SP$V$
```

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```
408 PRINT#-2,TAB(X)SP$V$TAB(43+X
+Q*6)"          "SP$V$L$
410 PRINT#-2,TAB(X)SP$V$L$TAB(43
+X+Q*6)"          "SP$V$" (FIFTH)"
412 PRINT#-2,TAB(X)L$V$SP$V$L$TA
B(43+X+Q*6)"LOSER H "L$V$
414 PRINT#-2,TAB(X+25+Q*2+Z)V$SP
$V$
416 PRINT#-2,TAB(X+Z)"          LOSER
 D "L$V$SP$V$
418 PRINT#-2,TAB(X)ES$" "SP$V$L$
LL$
420 PRINT#-2,TAB(X)L$SP$"   "SP$V
$SP$" "V$
422 PRINT#-2,TAB(X)SP$V$TAB(34+X
+HJ)SP$V$SP$"G"V$L$
424 PRINT#-2,TAB(X)SP$V$L$SP$" "
V$SP$" "V$SP$V$
426 PRINT#-2,TAB(X)L$V$SP$V$L$V$
SP$" "V$SP$V$
428 PRINT#-2,TAB(X+25+Q*2+Z)V$ES
$" "V$SP$V$
430 PRINT#-2,TAB(X+Z)"          LOSER
 C "L$V$STRING$(Z,32)"     LOSER
 E "L$LL$V$SP$V$
432 PRINT#-2,TAB(X+12+Q*2)" "ES$
SP$"    "SP$V$
434 PRINT#-2,TAB(X)ES$SP$SP$"
 "SP$V$
436 PRINT#-2,TAB(X)L$SP$"   "SP$"
  "SP$SP$V$FL$
438 PRINT#-2,TAB(X)SP$V$TAB(X+34
+HJ)SP$"    "SP$SP$V$FR$
440 PRINT#-2,TAB(X)SP$V$L$SP$"
   "SP$SP$V$
442 PRINT#-2,TAB(X)L$V$SP$V$SP$"
   "SP$SP$V$
444 PRINT#-2,TAB(X)ES$V$L$" "SP$
SP$"   "V$
446 PRINT#-2,TAB(X+Z)"          LOSER
 B "L$V$SP$V$SP$SP$"   "V$
448 PRINT#-2,TAB(X)ES$" "SP$V$L$
LL$SP$" "V$
450 PRINT#-2,TAB(X)L$SP$"   "SP$V
$SP$" "V$SP$V$
452 PRINT#-2,TAB(X)SP$V$TAB(X+33
+HJ)" "SP$V$SP$"H"V$L$V$
454 PRINT#-2,TAB(X)SP$V$L$SP$" "
V$SP$" "V$
456 PRINT#-2,TAB(X)L$V$SP$V$L$V$
SP$" "V$
458 PRINT#-2,TAB(X+33+HJ)V$ES$"
"V$
460 PRINT#-2,TAB(X+Z)"          LOSER
```

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```
 A "L$V$STRING$(Z,32)"     LOSER
 F "L$LL$V$:FP=1
462 CLS0:PRINT@224," PRESS <ENTE
R> FOR BOUT SHEETS.":PRINT" PRES
S <A> FOR ANOTHER BRACKET."
464 X$=INKEY$:IFX$=CHR$(13)THEN4
66ELSEIFX$="A"THEN278ELSE464
466 SN=1:FORQ=1TO8
468 BP$(1)=PR$(Q):BP$(2)=PR$(17-
Q)
470 FR$(1)=PF$(Q):FR$(2)=PF$(17-
Q)
472 R=Q:U=17-Q
474 GOSUB490
476 GOSUB482
478 NEXTQ
480 GOTO462
482 CLS0:PRINT@256," (R)EPEAT CO
PY OR (N)EXT SHEET ?";
484 FOR QJ=1TO4:PRINT#-2," ":NEX
TQJ
486 X$=INKEY$:IFX$="R"THENGOSUB4
90 ELSE IFX$="N"THEN RETURN ELSE
 486
488 GOTO482
490 PRINT#-2,CHR$(30);TAB(10)"CO
LOR"STRING$(15,95)TAB(53)"COLOR"
STRING$(15,95)
492 PRINT#-2,TAB(2);:PRINT#-2,US
ING"###.";R+VJ;:PRINT#-2,TAB(45)
;:PRINT#-2,USING"###.";U+VJ
494 PRINT#-2,TAB(10)"NAME: ";BP$
(1);TAB(53);BP$(2)
496 PRINT#-2,"DRAW NO.  FROM: "F
R$(1);TAB(43)"DRAW NO.  FROM: "F
R$(2)
498 FOR RP=1TO2:PRINT#-2,"SESSIO
N: "SN;" CAT: ";W$;TAB(43);:NEXT
RP
500 RETURN
990 REM FIRST NUMBER IS TOTAL #
OF PARTICIPANTS - SECOND NUMBER
IS THE NUMBER RANKED
1000 DATA 11,4
1005 REM ENTER GROUP,CATEGORY
1010 DATA JUNIORS,ASSORTED
1015 REM ENTER NAME,AFFILIATION
1020 DATA ANDY POTVIN,DRURY
1030 DATA DAVID LANOUE,MT.EVERET
1040 DATA DAN TROMBLEY,DRURY
1050 DATA KEVIN TASSONE,DRURY
1060 DATA SEAN HOHMAN,MT.EVERET
1070 DATA MIKE BEAUDRY,DRURY
1080 DATA KURT DIGRIGOLI,MON.MT.
1090 DATA GORDY SOULE,MON.MT
1100 DATA STEVE POTVIN,DRURY
1110 DATA DAVE LUPIANI,MT.EVERET
1120 DATA MATT LAMERE,DRURY
```

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The Rainbow's Second Annual

SIMULATION CONTEST

The Rainbow's second Simulation Contest concluded September 1 and our judges are now busily reviewing the entries. Our contestants will have a chance to share their Simulation worldwide; not only will the top winners be published in THE RAINBOW, but the top two dozen, or so, will be included in a special Simulation book, as well. And, just look at the prizes provided by these generous companies:

K-BASIC Language Compiler for OS-9 and five DOs (Shell command language for OS-9) altogether valued at $544	**Lloyd I/O**
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Complete data communications package — a TDP Modem 1, *VIP Terminal* software, serial interface cable and "May Phone" (one-piece telephone), retail value $150	**DSL Computer Products, Inc.**
Styleograph Word Processing Center, $120	**Great Plains Computer Company, Inc.**
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Three-program gift package worth $60	**E.D.C. Industries**
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To be announced	**Syntactics**

While winning contestants in the just-concluded contest will have the opportunity to be in our *second* Simulation book, look for the *first* ***Rainbow Book Of Simulations*** and its companion ***Rainbow Simulation Tape*** being published later this fall. The book features two dozen prize-winning Simulations from last year's contest and both it and the tape will soon be available directly from THE RAINBOW and through selected distributors.

PROGRAMMING UTILITY

4K or MC-10

Expanding

LITTLE E's

Powers

By H. Allen Curtis

Little E was first presented in the April '84 RAINBOW. It gave much-needed editing powers to the MC-10 and the CoCo with Color BASIC, and also gave the Coco with Extended Color BASIC cursor controlled editing facilities.

Little E will presently be endowed with vastly greater powers:

1) It will be used for the direct entry of new lines of BASIC, as well as for editing.
2) After the completion of typing a new line or editing an old one, the next line will be displayed for you to type or edit.
3) The cursor will be allowed upward movement. When the down arrow reaches its downward limit, it will move to a position three spaces from the top leftmost portion of the screen.
4) Whether typing or editing a line on the MC-10, you will be able to type commands with a single keystroke when the CONTROL key is depressed.
5) *Little E* will be the foundation of a rudimentary word processor which can even be used with a 4K CoCo or MC-10.

(H. Allen Curtis resides in Williamsburg, Va. He is interested in 17th and 18th century history and enjoys biking through the colonial capital. He balances past and present with his computer work.)

Upgraded versions of *Little E* for the CoCo and the MC-10 are presented in Listings 1 and 2, respectively. Each of the programs of Listings 1 and 2 generates a machine language program that will be stored in high RAM. *Rainbow Check Plus* is also stored in the high RAM area. Running the program of Listing 1 or 2 will overwrite *Rainbow Check Plus*; therefore, do not run the new *Little E* until you have typed it correctly in its entirety. Upon completing the typing correctly, save the new *Little E* on tape or disk before running it.

The new *Little E*, like its predecessor, allows the BASIC interpreter of your computer to recognize the *e* command. The *e* command has the same format as before, but has greater capabilities. The right, left and down arrows still control cursor movement. Now, however, upward movement can be achieved with the down arrow. Deletion and insertion are accomplished in the same manner as they were formerly: Use the *L. DEL.* key on the MC-10 and the CoCo's CLEAR key for deletion. Use *Shift* @ for insertion on either computer.

To discover the new capabilities of the *e* command try the following examples:

Example 1: Run the new *Little E*. After a few seconds a question will be printed on the screen. The question is concerned with *Little E*'s word processing facilities which will be explained in Example 3. Therefore, type N in response to the question. Then type *e60* and press ENTER. Remember, to put the computer in the lowercase mode you must type 0 with the shift key depressed. Entry to the *e* command returns the computer to the uppercase mode. Line 60 of the BASIC part of *Little E* will be displayed. Note that the cursor is at the end of the displayed line. Press ENTER and Line 70 will replace 60 on the screen. Continue pressing ENTER until you reach Line 110. Type at the end of Line 110 the following: *:REM EXAMPLE1* and press ENTER. Then press BREAK to return to BASIC. Next, *LIST 60-110* to see that Lines 60 through 100 have not changed but that Line 110 has, indeed, been altered.

Pressing ENTER not only causes an edited line to be included in the BASIC program, but also brings the next line to the screen for possible editing. Pressing the BREAK key provides an exit from the *e* command without changing the original composition of a line.

As was the case for the former *e* command, the position of the cursor when ENTER is pressed determines the end of the BASIC line added to the program.

Example 2: *LIST* the entire BASIC program now residing in your computer. Notice that there is no Line 800. Then type *e800* and press ENTER. Formerly, the *e* command would not accept an unlisted line number. Type *STOP :REMEX2* and press ENTER. Unlisted Line 810 is now ready for similar entry. However, press BREAK and then *LIST 800-* to verify that you have added Line 800 to the program.

Pressing ENTER causes a new line to be added to a current BASIC program and the advance to the next line for typing or editing. The next line displayed always has a number 10 greater than the one just ENTERed.

Example 3: Rerun *Little E.* This time answer the question in the affirmative by typing Y. This answer prompts another question. Respond to that question by typing the number 32. Then use *NEW* to erase the BASIC program. Employing the *e* command, type the following three lines:

```
10 L$(0)="
20 L$(1)="
30 L$(2)="
```

MC-10 users will encounter a peculiarity: Line 10 of the erased program will be displayed. Just move the cursor next to the line number and type the new line. Lines 20 and 30 will then be initially blank as you would expect. Whether you have a MC-10 or CoCo, press BREAK when you reach Line 40. Type *e10*, press ENTER and type the following sentence: This illustrates one of *Little E*'s word processing features: wrap around.

When Line 10 is displayed, you will have to switch your computer to the lowercase mode to type the sentence. When you finish the sentence, press ENTER and then BREAK. Remember to switch back to the uppercase mode. *LISTing* should reveal that the three lines are now:

```
10 L$(0)="This illustrates one of
LITTLE
20 L$(1)="E's WORD PROCESS
ING features:
30 L$(2)="WRAP-AROUND.
```

You should have noticed the automatic transition from one line to another when you completed typing 32 characters on a line. Also, if the final word of the line was incomplete, that word was deleted from the line and inserted at the beginning of the next line. Wrap-around is the name given to this word processing feature of the new *Little E.*

> ***"To gain additional familiarity with* Little E *make up your own examples testing cursor movement, character deletion and character insertion."***

It should be pointed out that the character line length is measured from the entry cursor position. Therefore, when you change an established line by means of the *e* command, you must not expect automatic wrap-around to occur.

To gain additional familiarity with *Little E* make up your own examples testing cursor movement, character deletion and character insertion. In the case of the MC-10 verify that *Little E* now allows CONTROL key command typing.

Example 3 is indicative of how *Little E* can be utilized in word processing. Lines 10 through 30 are characteristic of lines forming a skeleton program which you must employ in conjunction with *Little E* for word processing. Listing 3 shows a typical skeleton program for the CoCo. Replacing each *PRINT#-2* in Line 620 with *LPRINT* yields a typical MC-10 skeleton program.

When you give body to the skeleton by using *Little E* to type 28 strings *L$(I)*, the program will then print a full, double-spaced page on your printer.

Depending on the size of your computer's RAM, you may wish to add features to the skeleton program. For instance, you may want to double the number of strings, *L$(I)*, for a full, single-spaced page. You may wish to add a routine to display the page or part thereof on the video screen.

The word processor consisting of the skeleton and *Little E* has the following properties:

1) Line length can be specified.
2) There is cursor controlled entry of lines.
3) There is line-to-line wrap-around which is sufficiently fast for touch typists.
4) Lines can be readily changed or replaced through editing.
5) Editing can be used to move lines by merely changing the I values in the pertinent strings *L$(I).*
6) Each page can be saved on tape or disk by *CSAVEing* or *SAVEing*, respectively, the filled in skeleton.
7) Each saved page can be loaded from tape or disk by *CLOADing* or *LOADing*, respectively.
8) Learning to use it is easy.

As you can see, *Little E*'s word processor, though rudimentary, is rather powerful.

New *Little E*, like its predecessor, is relocatable. So new *Little E* and *Rainbow Check Plus* can be used together in the typing BASIC programs in the RAINBOW when the following changes are made: Replace Lines 10 and 30 of Listing 1 with:

```
10 CLS:X=256*PEEK(116)-244
30 X=256*PEEK(116)-243
```

Similarly, replace Lines 10 and 30 of Listing 2 with:

```
10 CLS:X=256*PEEK(16976)-401
30 X=256*PEEK(16976)-400
```

When using *Rainbow Check Plus* and *Little E* together, always load and run the former before loading and running the latter.

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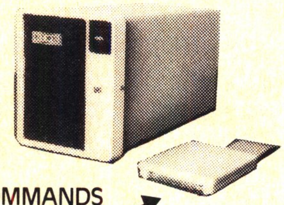

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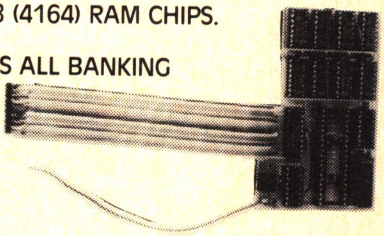

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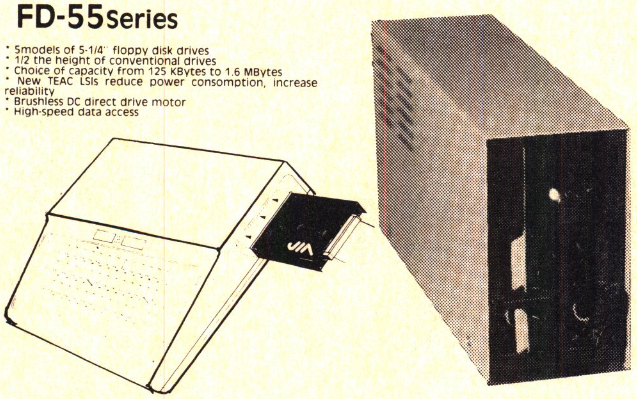

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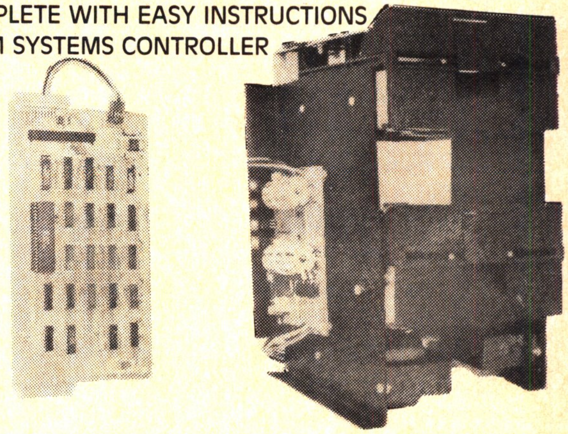

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150...... 235
250...... 244
END 207

Listing 1:

```
10 CLS:X=256*PEEK(116)-166
20 CLEAR25,X
30 X=256*PEEK(116)-165
40 FORZ=X TOX+420
50 READY:W=W+Y
60 POKEZ,Y:NEXT
70 IFW<>46159THENPRINT"DATA ERRO
R":STOP
80 POKE474,1
90 PRINT@193,"DO YOU WANT WRAP-A
ROUND? (Y/N)  ";:GOSUB300:PRINTK
$:IFK$<>"Y"THEN130
100 PRINT@257,"TYPE A NUMBER BET
WEEN 1 AND 80  TO SPECIFY LINE L
ENGTH. ";
110 GOSUB300:IFASC(K$)=13THEN120
ELSEL$=L$+K$:PRINTK$;:IFLEN(L$)<
2THEN110
120 L=VAL(L$):IFL>0 AND L<81 THE
NPOKEX+83,L
130 EXECX:END
140 DATA 48,140,15,191,1,143,134
,126,183,1,142,48,140,28,191,1,1
28,57,157,165,129,101,38,249,122
,1,26
150 DATA 189,169,40,134,126,183,
1,127,15,59,157,159,126,183,100,
13,59,38,18,12,59,236,2,147,43
160 DATA 39,11,142,2,220,159,166
,12,167,189,185,156,134,57,183,1
,127,142,4,254,166,130,129,96,39
,250
170 DATA 48,1,51,137,0,252,255,1
,219,159,136,125,1,218,38,28,124
,1,218,16,158,126,166,162,38,252
,111
180 DATA 160,166,160,39,5,189,16
2,133,32,247,150,125,189,162,133
,158,136,166,132,151,44,189,161,
177,129,9,38,18,141,9
190 DATA 140,4,252,36,242,48,1,3
2,199,158,136,150,44,167,132,57,
129,12,38,13,158,136,140,4,253,3
6,214
200 DATA 166,1,167,128,32,245,12
9,10,38,17,141,226,140,4,221,36,
5,48,136,32
210 DATA 32,214,142,4,3,32,209,1
29,8,38,11,141,205,140,4,0,39,18
2,48,31,32,194,129,19,38,21,142,
4,252,156,136,39,6
220 DATA 166,130,167,1,32,246,15
0,44,167,1,134,96,32,151,129,3,3
8,3,126,172,115,129,13,39,27,140
,4,252,44,133
230 DATA 188,1,219,44,8,189,162,
133,48,1,22,255,120,129,32,39,5,
151,125,127,1,218,142,2,220,159,
166,48,1
240 DATA 206,4,0,166,192,43,12,1
29,64,37,6,129,96,37,4,139,96,13
9,96,167,128,17,147,136,38,233
250 DATA 111,132,125,1,218,38,10
,159,126,166,130,129,32,38,250,1
11,132,157,159,189,175,103,158,4
3,191
260 DATA 2,218,189,184,33,215,3,
189,173,1,37,18,220,71,163,132,2
11,27,221,27,238,132,55,2,167,12
8,156
270 DATA 27,38,248,182,2,220,39,
28,220,27,221,67,219,3,137,0,221
,65,189,172,30,206,2,216,55,2,16
7,128
280 DATA 156,69,38,248,158,65,15
9,27,189,173,33,189,172,239,158,
43,198,10,58,31,16,189,180,244
290 DATA 189,189,217,206,2,220,2
23,166,166,128,167,192,38,250,22
,254,118
300 K$=INKEY$:IFK$=""THEN300ELSE
RETURN
```

150...... 255
250...... 194
END 21

Listing 2: **MC-10**

```
10 CLS:X=256*PEEK(16976)-310
20 CLEAR25,X
30 X=256*PEEK(16976)-309
40 FORZ=X TOX+564:READY:W=W+Y:PO
KEZ,Y:NEXT
60 PRINT@193,"DO YOU WANT WRAP-A
ROUND? (Y/N)  ";:GOSUB700:PRINTK
$:IFK$<>"Y"THEN110
70 PRINT@257,"TYPE A NUMBER BETW
EEN 1 AND 80  TO SPECIFY LINE LE
NGTH. ";
80 GOSUB700:IFASC(K$)=13THEN100
90 L$=L$+K$:PRINTK$;:IFLEN(L$)<2
THEN80
100 L=VAL(L$):IFL>0 AND L<81 THE
NPOKEX+145,L
110 EXECX:END
120 DATA 198,12,58,255,66,152,13
```

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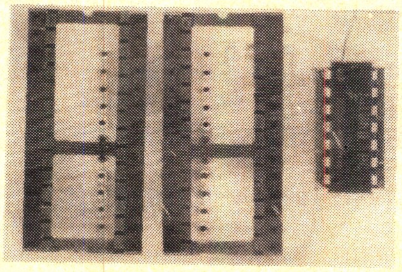

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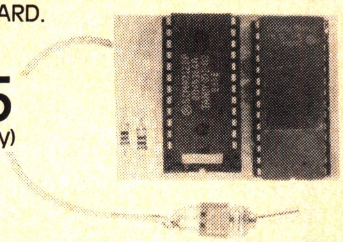

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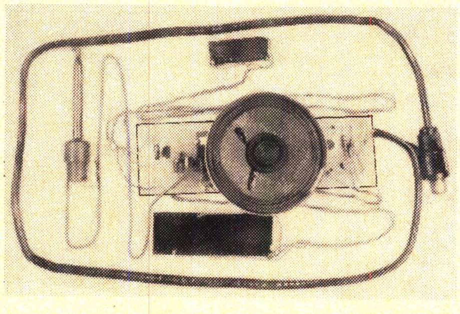

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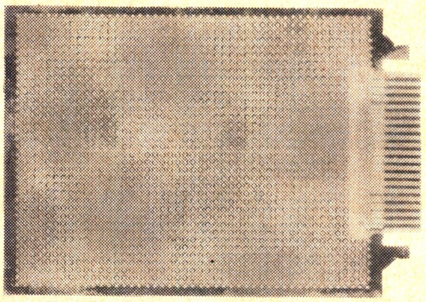

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```
4,126,183,66,151,57,157,243,129,
101,38,249,122
130 DATA 66,28,189,251,212,222,2
44,189,231,168,157,235,189,230,1
78,189,227,185
140 DATA 236,2,147,165,38,98,8,8
,8,8,223,137,127,66,132,134,32,1
40,134,33
150 DATA 222,137,132,127,189,249
,201,166,0,8,77,39,71,246,66,132
,129,34,38,5,200
160 DATA 1,247,66,132,129,58,38,
9,197,1,38,5,196,253,247,66,132,
77,42,219,93,38
170 DATA 216,129,133,38,2,202,2,
129,131,38,2,202,4,247,66,132,12
9,200,34,191
180 DATA 189,228,178,166,0,43,18
6,8,189,249,201,32,246,254,66,12
8,150,166
190 DATA 167,0,57,254,66,128,198
,127,58,255,66,88,125,66,87,38,2
7,124,66,87,254,66,91,9,166,0,38
200 DATA 251,8,166,0,39,5,189,24
9,201,32,246,182,66,90,189,249,2
01,254,66,128,255,66,128,166,0,1
51,166
210 DATA 189,248,104,129,9,38,10
,141,188,140,64,127,36,242,8,32,
232,129,21,38,15,254,66,128,140,
64
220 DATA 128,36,217,166,1,167,0,
8,32,244,129,10,38,17,141,155,14
0,64,96,36,5,198,32,58,32,197,20
6
230 DATA 64,3,32,192,129,8,38,10
,141,134,140,64,0,39,188,9,32,17
8,129,19,38,23,206,64,127,188
240 DATA 66,128,39,7,9,166,0,167
,1,32,244,150,166,167,1,134,96,3
2,156,129,3,38
250 DATA 3,126,226,113,129,13,39
,57,140,64,126,34,197,188,66,88,
44,37,125,66,58,38,6,189,249,201
,8,32,181,189,228
260 DATA 178,166,0,8,60,54,132,1
27,222,137,189,251,30,223,137,50
,56,77,42,237,222,137
270 DATA 32,155,129,32,39,6,183,
66,90,127,66,87,206,66,177,223,2
44,8,223,181,206,64,0,223,183,16
6,0,42,8,246
280 DATA 66,130,196,112,27,32,12
,129,64,37,6,129,96,37,4,139,96,
139,96,222,181,167,0,8,223,181,2
22,183,8,188
290 DATA 66,128,38,215,222,181,1
11,0,125,66,87,38,12,255,66,91,9
,166,0,129,32,38,249
300 DATA 111,0,157,235,189,230,1
78,222,165,255,66,176,189,227,17
,215,130,189,227,185,37,28,220,1
93,163,0
310 DATA 211,149,221,149,7,54,15
9,145,15,174,0,52,50,167,0,8,156
,149,38,248,158,145,50,6,182,66,
178,39
320 DATA 37,220,149,221,189,219,
130,137,0,221,187,189,225,254,7,
54,159,145,15,142,66,173,50,167,
0,8,156,191
330 DATA 38,248,158,145,50,6,222
,187,223,149,189,227,217,189,226
,243,220,165,195,0,10,189,236,22
7,189
340 DATA 244,38,60,206,66,178,22
3,244,223,181,56,166,0,8,60,222,
181,167,0,8,77,38,241,56,254,66,
152,110,9
700 K$=INKEY$:IFK$=""THEN700
710 RETURN
```

Listing 3:

```
10 DIML$(27)
20 L$(0)="
30 L$(1)="
40 L$(2)="
50 L$(3)="
60 L$(4)="
70 L$(5)="
80 L$(6)="
90 L$(7)="
100 L$(8)="
110 L$(9)="
120 L$(10)="
130 L$(11)="
140 L$(12)="
150 L$(13)="
160 L$(14)="
170 L$(15)="
180 L$(16)="
190 L$(17)="
200 L$(18)="
210 L$(19)="
220 L$(20)="
230 L$(21)="
240 L$(22)="
250 L$(23)="
260 L$(24)="
270 L$(25)="
280 L$(26)="
290 L$(27)="
600 STOP
610 FORI=0TO27
620 PRINT#-2,"              ";L$(I):
PRINT#-2:NEXT
```

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...I would like to take this opportunity to thank you, our customers, our project development team, and sales staff for making us Canada's largest Color Computer software & peripheral distributor.

Our project team spends countless hours designing, developing and testing our fine products. Well beyond the call of duty, they spend their hours eating and breathing their work. Forty hour marathon shifts not uncommon, they're undoubtedly North America's MOST gifted Color Computer team, having developed products that are precedent setting across the computer world. They are the back bone of our company, however the credit for their work could not be realized without the expertise of our sales staff. Our sales staff spends more time learning and understanding our products than they do marketing. They spend many personal hours studying our products in relation to you, the customer. They provide the link between the products and you. They were selected for their skills and friendliness to the customer. They bend over backwards to help you understand our products, and serve you in your needs.

Our marketing strategy is to help you understand the product. Our products sell themselves. The dedication and patience of our production techniciens who ensure our high quality standards cannot go unmentioned. Great care was taken by them on their own initiative to guarantee to you the finest workmanship money can buy. All of this would be to no avail if it wasn't for you, our customer. I would like to thank you for making us what we are. We appreciate your ideas and support and for you just being there.

My special thanks to John Kunze, our brilliant systems design analyst for his tireless effort in bringing the Color Computer into the big league with his fixed hard drive system with an exceptional level of price/performance.

To Gabriel Gal, our far sighted electronics engineer to give that extra muscle of a 128K to our Color Computer systems.

The tolerance and forebearance of Karen Graham and Sharron Curley in coordinating our overall Canadian operation, who have turned many mountains into molehills. A sweet smile goes a long way.

We have great confidence in Dan Pluta (MSc.) of University of Philidelphia who has the arduous task of heading up our U.S. operation. His skill and knowlege has impressed us all. We welcome his arrival into our team and pledge our utmost support to him and through him to all of our U.S. customers.

And last, but far from least, to Tony Distefano, lord of CoCo hardware for his brilliant ingenuity in his design of the ROM based cards and color video interface. Also, his tid-bits, criticism and overall general aid which have proved to be invaluable to us.

and as for me, I'm just the president...

Robert Sajo

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Introducing a new bimonthly column . . .

Welcome To The World Of Telecommunications

By R. Wayne Day
Rainbow Contributing Editor

The world of communications for a Color Computer enthusiast is almost unlimited. CoCo owners are hooking into mainframe computers, radios, satellites, bulletin boards . . . you name it, and a CoCo owner has probably tried it.

Beginning this month, THE RAINBOW and I will try to ease your journey through the world of telecommunications through this column, as well as give you an idea of some of the other communications applications that you can try with your CoCo.

I'd like your help in this effort, though. If you have some particular problem that's been plaguing you, or you have an interesting application for using the CoCo to communicate with someone or something else, be sure to let us know about it. My addresses are at end of this column.

(Wayne Day, a traffic engineering signal technician, is the SYSOP of The Color SIG of CompuServe, the world's largest consumer information service. He is also a certified paramedic and works part-time for an Emergency Medical Service provider. His amateur radio operator call sign is WA5WDB.)

What Are We Talking About?

A simple description of telecommunications (simple if you talk computer-ese) is "remote operation of a host system through a modem by means of a terminal emulator."

Simple, right?

Let's take "terminal emulator" and see what we can decipher in that, first.

In the world of computers, quite a few of those used by businesses and universities are not the personal computers that you and I are familiar with. Unlike a CoCo, they normally do not have a keyboard attached to the computer itself, and certainly don't use a television for output.

So, how do the "big guys" talk to their computers?

They attach terminals, input/output devices, to them.

Terminals come in all shapes and sizes. Most all of them include a keyboard for the operator to input data; some of them have video screens for the output, while others have printers attached to them.

How does that fit in with the CoCo?

What we're doing with the CoCo is running a program that makes our computer *act like a terminal* . . . converting anything we type on the keyboard into ASCII (American Standards Code for Information Interchange) standard characters that can be understood by another system.

On the flip side, we translate the ASCII characters the other computer is sending us, into data that the CoCo can display.

The "remote" portion of that sentence means that we're somewhere else than the system we're "talking" to (also known as the "host").

And, "modem" is an abbreviation for MOdulator/DEModulator, the hardware device that goes in between our computer and the telephone lines. It modulates, or converts, the electrical pulses the terminal program generates into audio tones that can be sent over the phone lines.

In return, it demodulates the audio tones from the host system, into electrical pulses that our computer can use.

Who Are These Hosts I Can Talk To?

The electronic "hosts" come in all shapes and sizes.

One of the more popular aspects of modem-ing is to hook into one of the thousands of Bulletin Board Systems that have sprung up around the world in the last few years.

These BBSs, which we'll go into more detail about later, may be of general interest, or dedicated to a particular subject. There are quite a few BBSs dedicated to the Color Computer, for example, while others may be of particular interest to owners of other computer systems, while still others may be dedicated to Adventure games, amateur radio, geneology, or maybe one of the many "boards" that are in-tune with a more adult crowd.

There are also quite a few "VIDEOTEXT" services available throughout the United States and Canada today that are available to CoCo owners through their modems.

One such service, called "STAR-TEXT" is a joint project of the *Fort Worth Star-Telegram* newspaper and Radio Shack, and is available to computer users in the Fort Worth-Dallas area.

Subscribers dial up a local telephone number and are answered by the STAR-TEXT host computer, which dishes out the news items, classifieds or other information that the computer user has asked for, all at $7.95 a month for unlimited access to the system.

Other popular electronic services are the nationwide consumer-oriented information services, such as CompuServe and The Source.

On these services, you'll find a multiplicity of things to do — shopping at home, on-line travel planning, electronic magazines, and a variety of services that are geared to a specific family of computer users.

One such service is The Color Computer Special Interest Group (CCSIG) on CompuServe, of which I am the systems operator (SYSOP).

The CCSIG is devoted to topics of specific interest to Color Computer users and can be compared to one of the local bulletin boards that are dedicated to the CoCo, but only up to a point.

For example, a local BBS normally can handle only one person using it at a time, while on the CCSIG, since CompuServe is a multi-user facility, there's really no limit to the folks that can be "on" the SIG at one time.

One of our more popular features, as a matter of fact, is based on the multi-user concept; CONFERENCE, where anyone can come on and "talk" to other users on the SIG. We have had as many as 30 users all "talking" to each other during a conference featuring Ken Kaplan, the president of Microware, who was talking about the OS-9 implementation on the CoCo.

Another popular feature of the CCSIG, as well as on local BBSs, is the database section of the service. In these databases, you can usually find programs which are submitted by other users, available for "downloading" into your computer, so you can load it and run it later.

Both The Source and CompuServe can be accessed through commercial communications networks called TYMENET and TELENET. Additionally, CompuServe also maintains its own communications network, so that access to either network is usually just a *local* phone call away.

On-line systems are not limited to hobby use, either.

Color Computer users with terminal programs and a modem can also send "electronic mail" through the Post Office's ECOM and MCI Mail. The advantage in using one of these services, over the electronic mail offered by CompuServe or The Source, is that the recipient does not have to own a computer in order to retrieve the mail. Instead, the correspondence can be sent through the normal carrier-delivered mail.

Typesetting firms are now establishing electronic links so that computer users can come on-line with their systems, and send a text file to be typeset by the firm, saving the time needed to send the copy, be it advertising or a newsletter, to the typesetter, as well as reducing the manual labor needed to get the copy into typeset form.

I'm Convinced! What Do I Need To Get Started?

To telecommunicate over the telephone, the minimum configuration you'll need is a computer, a modem, and terminal software.

All of the Color Computers have an RS-232 port on the back of the computer. The modem will attach to the RS-232 port, either with a cable supplied by the modem manufacturer, by Radio Shack, or one that you can make on your own.

Modems come in two basic styles: direct connection to the telephone lines, or acoustically coupling the telephone with the modem.

The acoustically coupled modem is usually less expensive, and does not require any electrical connection to the telephone system, if that's a concern, or you plan to use the modem on a party line or a pay phone (that's a no-no for direct-connect modems, according to federal regulations).

The handset fits into two rubber cups on the modem, and a little speaker and a microphone inside those cups take the tones from the phone, and work them into the innards of the modem.

A direct-connect modem, on the other hand, usually has a modular-type plug so that you can just plug the phone line right into the modem. Being directly connected to the phone line, there's less chance of incorrect data being passed because of background noise in the room.

Direct-connect modems can be "plain Jane" like the Radio Shack Modem I,

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or can have some extra bells and whistles like automatically dialing the phone for you, or automatically answering the phone, which is needed if you ever want to run a BBS of your own.

Do you need a fancy modem? No, not really. What you're paying extra for is convenience and extra capabilities. You might want to get started with a less expensive modem, then upgrade later, as your needs and desires increase.

In a future column, we'll take a more in-depth look at modems, and discuss some of the various configurations they come in.

The Terminal Program

The terminal program is the real key to successful telecommunicating.

Terminal programs come in two basic versions — smart and dumb.

The "dumb" terminals allow you to type information on your keyboard and have it sent out the RS-232 port. They also receive info on the RS-232 line, and put it up on the screen. Usually, that's about all they do.

Assume, though, for a minute, that you are going to call up a local BBS and want to check your electronic mail, and get a couple of new programs that have been put on the board by other users.

If you had a terminal program that would allow you to load a message that you had composed on a word-processor before you logged onto the BBS, that would save you a lot of time over hand-entering the message to someone else. If the BBS was a long-distance phone call, that time would equal money in your pocket.

Then, too, if your terminal program had the capability to "capture" the data sent from the BBS, you wouldn't have to write down your mail, letter by letter, in order to have some way of getting it on paper. You could just print a copy of the mail out on your printer.

Now, on that downloaded program you wanted to save, you could just print it out and re-enter it if it were in BASIC, but what happens if it's in machine language? If your terminal had some way of sending and receiving data, and checking to make sure that data was correct, and it could save that data to disk or tape for you, your problem would be solved.

All of those capabilities exist, in some form or another, on programs we refer to as "smart terminals," and that will be our major topic of discussion next month in THE RAINBOW's annual Data Communications issue.

Also, next month, we'll be publishing a selected list of some of the thousands of BBS systems in North America, especially those BBS systems that are dedicated to the Color Computer!

Let Me Hear From You

As I mentioned earlier, I'd like to make this column as responsive to your needs as possible, so let us know what you want or need.

If you're a CompuServe subscriber, you may send me EMAIL, or a message on The Color SIG. My CompuServe ID is 76703,376.

My MCI Mail ID is: 201-7723 and my TELEX address is: 650-201-7723.

Or a letter can be sent to:

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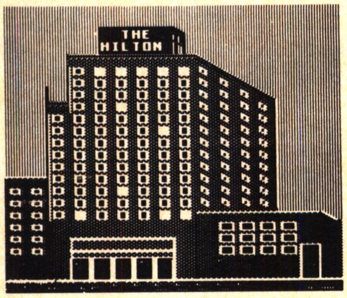

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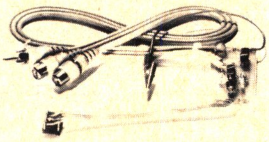

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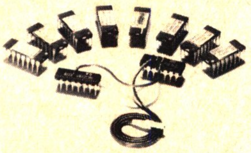

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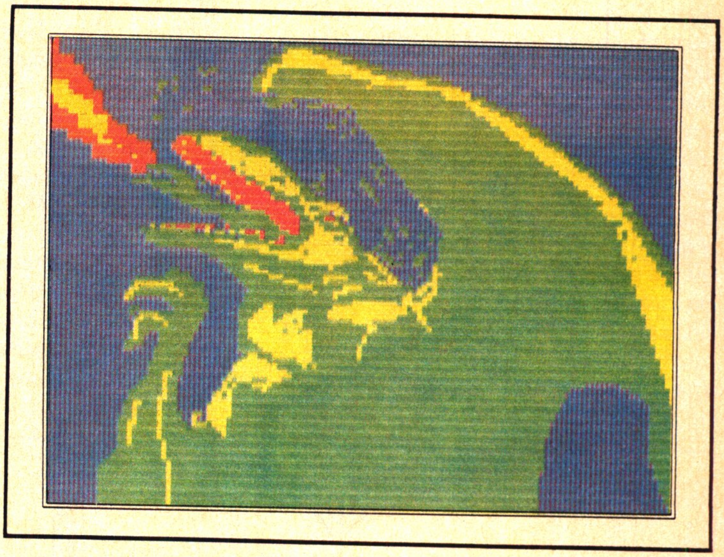


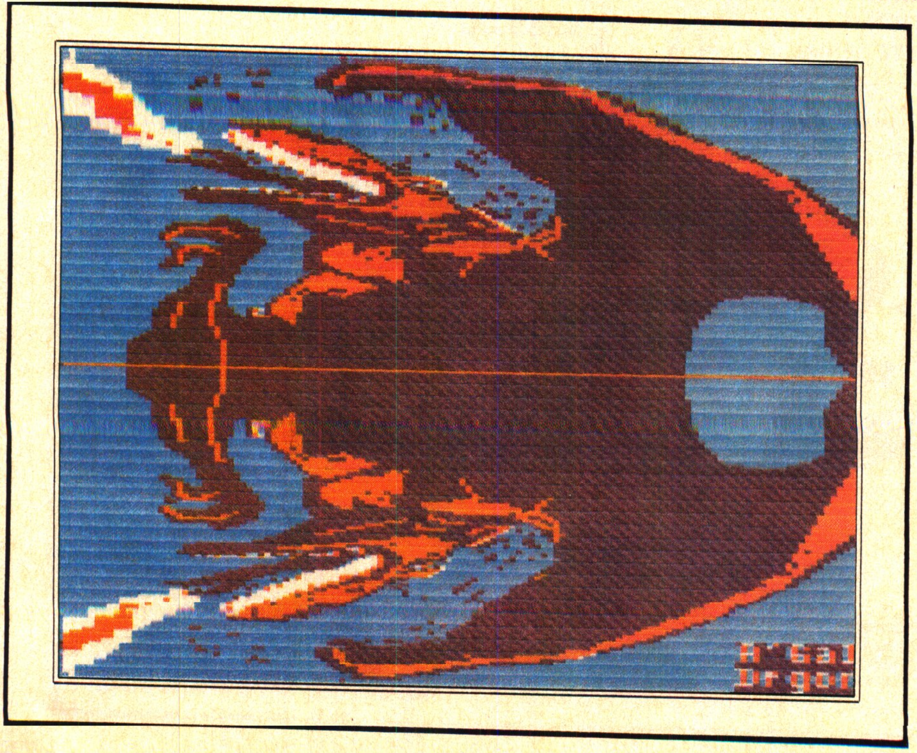
By Paul S. Hoffman

Here's another graphics program modification, prompted by a letter to THE RAINBOW way, way back in April 1982. Mr. Gary Burkhardt of Coldwater, Mich., asked for help in getting picture tapes from Radio Shack's *Art Gallery* dumped to printer. Not only is there no printer dump in *Art Gallery*, but *Art Gallery* picture tapes won't even load in using other programs or BASIC! Wouldn't it be nice if an *Art Gallery* picture could be saved like a standard machine language tape *CSAVEM*?

Having played around with adapting *Micropainter* to operate from disk (THE RAINBOW, March '84), and having newly acquired my 64K upgrade (which makes modifying ROM Pak programs simpler), I decided to tackle *Art Gallery's* tape save routine. I found two problems: *Art Gallery* creates tapes with a slightly different coding at the beginning, and the loading address is the same as the start of BASIC's text page memory, *$400*. I have replaced the 'tape save' portion of *Art Gallery* with a routine which creates a 'standard' machine language tape readable by BASIC's *CLOADM* routine. It turns out that *Art Gallery* will read these 'standard' tapes without any change in the tape input portion of the program.

The tapes created by this revision to *Art Gallery* must be *OFFSET LOADED* to be used by Extended or Disk Extended BASIC. If you are loading a tape into Extended BASIC (without disk), the offset is *$200 (CLOADM "", &H200)*. For Disk Extended BASIC, it's *$A00 (CLOADM "", &HA00)*.

Note: *Art Gallery* does not put a filename or title on a tape, so make sure to use two quotation marks to indicate a blank filename.



The tapes will also load automatically into my disk version of *Micropainter* without worrying about the offset — then they can be saved directly to disk. For those without *Micropainter*, Listing 3 will load files from modified *Art Gallery* tapes, display them, then save them to tape or disk at the revised addresses. The tapes will not load into The MicroWorks' *Magigraph* because of the loading address; first transfer the pictures using *Micropainter* or Listing 3, then you can make use of them with *Magigraph*.

To modify your version of *Art Gallery*, use Listing 1. Make sure to start-up in non-disk Extended BASIC, and dis-

---

(Paul Hoffman is an independent designer/artist and Color Computer programmer. He is the author of Computerware's Semi Draw *and a number of X-pad programs.)*

able the cartridge auto-start by entering "*POKE &HFF23,36.*" With a Multi-Pak Interface or other selectable-port interface, select the slot with the *Art Gallery* cartridge. Otherwise, insert the *Art Gallery* cartridge very carefully. Note: Plugging or unplugging cartridges with the power on can cause serious damage. This is *not* recommended. Now run Listing 1, which will copy the cartridge contents to lower memory, alter the tape save routine, and add a short routine to move the whole program back up to its proper memory addresses. You will end up with a machine language program called *ARTGAL* saved on cassette tape. Turn off your computer and then power up with the disk system engaged. Save the taped *ARTGAL* program to disk by typing the following:

```
CLOADM "ARTGAL" ENTER
SAVEM "ARTGAL/BIN",&H4000,
&H5014, &H5000
ENTER
```

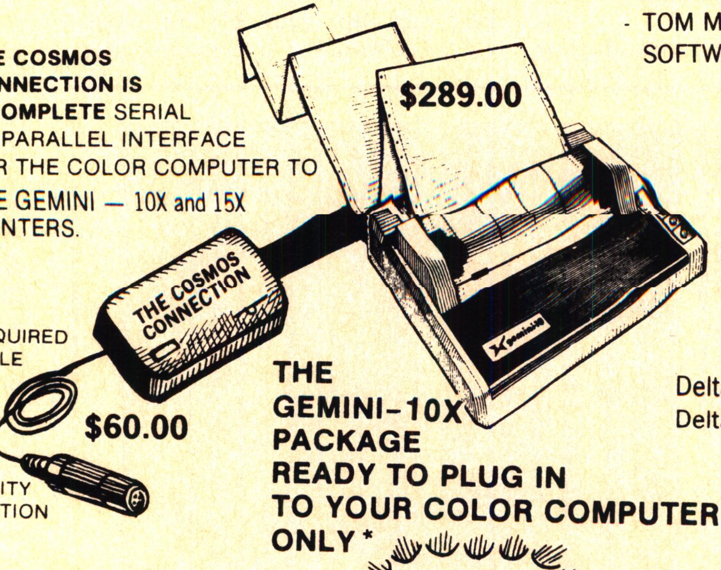
On the same disk, save Listing 2 as *ARTGAL/BAS.* Now when you *RUN ARTGAL,* the computer will be changed to 64K RAM operation with the BASIC ROMs copied to RAM. This is so that Disk BASIC can load your program, but then be replaced by *Art Gallery* operating in RAM but at its 'correct' address location; starting at *$C000,* the beginning of cartridge memory. The *ARTGAL/BAS* program will immediately execute the modified *Art Gallery.* You will not be able to return to BASIC because hitting Reset sends the computer off into oblivion, never to return without turning it off and back on.

Now, I can make modifications to any graphics in my files, using *Micropainter, Magigraph, Art Gallery, Graphicom,* or the *X-PAD* — the files are almost fully interchangeable. Figure 1 is a drawing from the *Art Gallery* side of Radio Shack's *Fantasy Images* tape (Cat. No. 26-3304). Figure 2 is the same picture modified by adding a mirror-image rubber stamp using *Graphicom* and shifting to the *PMODE4* artifacted colors. Both images were printed on the Transtar-315 Color Printer. Radio Shack's *CODUMP* software for the Tandy CGP-220 Color Ink-Jet Printer will not print a *PMODE ONE* picture which is the mode used by *Art Gallery* in the proper ratio.

160 247
END 128

Listing 1:

```
10 '******************************
*  CONVERTS <ART GALLERY> *
*     TO WRITE STANDARD    *
*  MACHINE LANGUAGE TAPES *
*     P. HOFFMAN, 1984     *
******************************
15 'NOTE:  64K NEEDED TO RUN
FINAL PROGRAM!
20 'REMEMBER TO START WITH ROM-
```



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```
    PACK AUTO-START DISABLED
    (POKE &HFF23, 36), THEN
30 'SWITCH TO THE INTERFACE SLOT
    CONTAINING ART GALLERY (IF
    YOU'RE USING MULTIPAK INTER-
    FACE)
40 'SOFTWARE SWITCHING WITH A
    POKE IS PREFERABLE TO USING
    THE FRONT SWITCH ON THE
    INTERFACE.
50 CLS:PRINT:PRINT"  READY TO MO
VE <ART GALLERY>     TO RAM AND
ALTER IT?            <PRESS ANY
KEY TO CONTINUE>
60 IF INKEY$ = "" THEN 60
65 PRINT:PRINT"  MOVING.....
70 FORM=&HC000 TO&HCFFF
80 POKEM-&H8000,PEEK(M)
90 NEXTM
100 FORX=1TO100
110 READ A$,B$
120 A$="&H"+A$:B$="&H"+B$
130 PRINTA$;" = ";B$
140 POKEVAL(A$),VAL(B$)
150 NEXT
160 DATA 4529,8E,452A,01,452B,E2
,452C,86,452D,02,452E,A7,452F,80
170 DATA 4530,6F,4531,80,4532,6F
,4533,80,4534,CC,4535,04,4536,00
180 DATA 4537,ED,4538,81,4539,ED
,453A,81,453B,86,453C,02,453D,97
190 DATA 453E,92,453F,8E,4540,00
,4541,00,4542,86,4543,02,4544,BD
200 DATA 4545,A6,4546,63,4547,0F
,4548,92,4549,BD,454A,A7,454B,D8
210 DATA 454C,8E,454D,04,454E,00
,454F,9F,4550,7E,4551,86,4552,FF
220 DATA 4553,97,4554,7D,4555,CC
,4556,1C,4557,00,4558,93,4559,7E
230 DATA 455A,27,455B,11,455C,10
,455D,83,455E,00,455F,FF,4560,24
240 DATA 4561,02,4562,D7,4563,7D
,4564,86,4565,01,4566,97,4567,7C
250 DATA 4568,BD,4569,A7,456A,F4
,456B,20,456C,E2,456D,86,456E,FF
260 DATA 456F,97,4570,7C,4571,0F
,4572,7D,4573,BD,4574,A7,4575,F4
270 DATA 4576,20,4577,08,5000,8E
,5001,40,5002,00,5003,10,5004,8E
280 DATA 5005,C0,5006,00,5007,EC
,5008,81,5009,8C,500A,50,500B,00
290 DATA 500C,27,500D,04,500E,ED
,500F,A1,5010,20,5011,F5,5012,7E
300 DATA 5013,C0,5014,00
310 PRINT:PRINT" READY TO SAVE A
LTERED PROGRAM    TO TAPE? (ANY K
```

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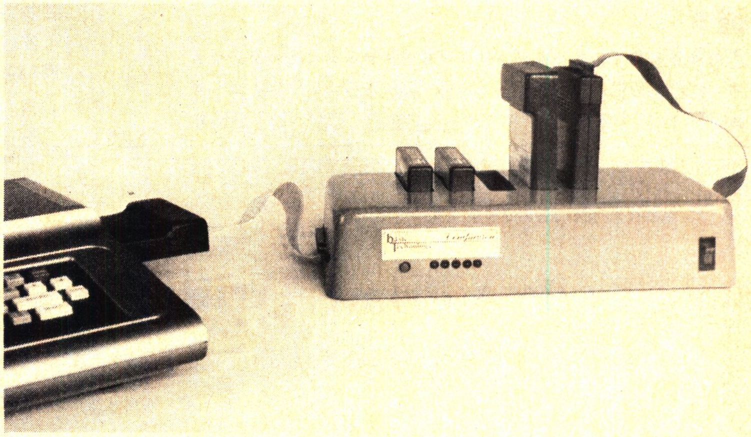

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```
EY TO CONINUE)
320 IFINKEY$=""THEN320
330 CSAVEM"ARTGAL",&H4000,&H5014
,&H5000
```

Listing 2:

```
0 '*******************************
  *   "ARTGAL/BAS" -- LOADS   *
  *   MODIFIED <ART GALLERY>  *
  *    FROM DISK & RUNS IT    *
  *****************************
1 '******** P. HOFFMAN *********
  *********** 1984 ************
5 '64K ROM-TO-RAM ROUTINE THANKS
  TO FRANK HOGG.
10 CLEAR999
20 DATA 26,80,190,128,0,183,255,
222,166,128
30 DATA 183,255,223,167,31,140,2
24,0,37,241,57
40 FORI=1TO21:READA:A$=A$+CHR$(A
):NEXTI
50 P=VARPTR(A$)+1
60 POKEP,126
70 EXECP
80 CLS:PRINT:PRINT"  NOW IN RAM!
"
90 LOADM"ARTGAL/BIN":POKE&HFF40,
0:EXEC&H5000
```

Listing 3:

```
0 '*****************************
  * LOADS MODIFIED ARTGAL PIX *
  * TO EITHER EXTENDED OR DISK*
  * BASIC                     *
1 '****** P. HOFFMAN **********
2 '********** 1984 *************
10 PMODE1,1:PCLS
20 CLS:PRINT:PRINT" POSITION REC
ORDER FOR PLAYBACK    - THEN PRES
S ANY KEY:"
30 IFINKEY$=""THEN30 ELSESCREEN1
,0
40 IFPEEK(&HBA)=6 THEN50 ELSEIFP
EEK(&HBA)=&HE THEN80 ELSEGOTO140
50 CLOADM"",&H200:GOSUB100
60 CSAVEMF$,&H600,&H1200,413
70 INPUT" ANOTHER PICTURE (Y/N)"
;I$:IFASC(I$)=89 THEN20ELSEEND
80 CLOADM"",&HA00:GOSUB100
90 SAVEMF$,&HE00,&H1A00,413:GOTO
70
100 IFINKEY$=""THEN100ELSEINPUT"
 NAME FOR SAVED FILE";F$:'******
*IF SAVING FOR DISK <MAGIGRAPH>,
 MAKE SURE TO USE "/MGF" EXTEN-
 SION *
110 PRINT" PRESS ANY KEY WHEN RE
ADY TO       RE-RECORD THE PICTU
RE.
120 IF INKEY$=""THEN120
130 RETURN
140 PRINT" GRAPHIC PAGES NOT SET
 PROPERLY":CLEAR:PCLEAR4
150 PRINT" PRESS <RESET> AND TRY
 RUNNING     AGAIN -- IF NO LUCK,
TURN THE     COMPUTER OFF AND RELO
AD THE       PROGRAM.":END
```

Hint . . .

How To Be A Printer Artist In One Easy Lesson

Anyone not having "Printer Artist" from the November 1983 issue of THE RAINBOW may find the following program useful.

```
10 READ A$
20 FOR X=1 TO LEN(A$) STEP 3
30 B$=MID$(A$,X,3)
40 C$=RIGHT$(B$,1)
50 PRINT#-2,STRING$(VAL(B$),C$);
60 NEXT X:PRINT#-2:GOTO 10
```

With this program you may enter each line of the printer mysteries as *DATA* statements. For example:

Line
1. 23SP,1X,12N
2. 19SP,1X,6SP,8$

would be entered as:

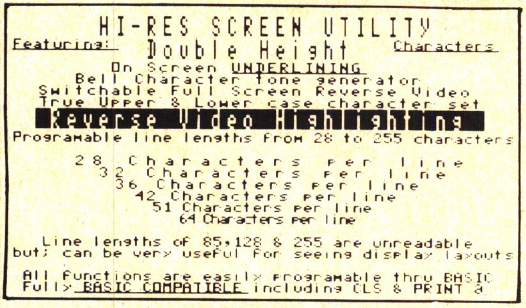
```
101 DATA 23 01X12N
102 DATA 19 01X06 08$
```

Start *DATA* statements at Line 101 (old line number plus 100) and change *INFO* to a two-digit number followed by the character you want printed. You must also drop the commas. The *23SP,1X,12N* becomes *'23 01X12N'.*

After you have any or all the lines changed, just type *RUN*. The program will print out the picture to your printer until it runs out of data. An OD Error will appear on the screen but this will not hurt anything. You may then go back and edit any errors until you have your picture correct. Then *SAVE* each program for future use.

Michael B. Kromeke

HI — RESOLUTION SCREEN UTILITY



```
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      2 8  C h a r a c t e r s  p e r  l i n e
        3 2  C h a r a c t e r s  p e r  l i n e
          3 6  C h a r a c t e r s  p e r  l i n e
             42 Characters per line
                51 Characters per line
                   64 Characters per line

    Line lengths of 85,128 & 255 are unreadable
but; can be very useful for seeing display layouts

  All functions are easily programable thru BASIC
  Fully BASIC COMPATIBLE including CLS & PRINT @
```

- FULLY BASIC COMPATIBLE
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TEXTPRO III is the most advanced Text Editing and Word Processing System available for the Color Computer. One of the reasons for this is, Textpro works in a totally different way than the other Color Computer Word Processing programs. It uses simple 2 character abbreviations of words or phrases for commands. These commands are used at the beginning of a line and are preceeded by a "." period. Several commands can be chained together on the same line for ease of use. Thru these commands you tell the Word Processor how you want the margins set, line length, indenting information, and so on. You can change the way you want a document formatted at any point in the document. You also have the freedom to write without worrying about how long the line is or where the margins are and so on. The Word Processor automatically takes words from one line to the next and fills out the printed line to the desired length. You can even use the command to Input Text from the Keyboard while a document is being processed, and use that information to change the formatting or enter any other valid text Processor command. With this kind of flexibility and an extensive set of commands and functions available, its no wonder that TEXTPRO III is the most advanced Word Processing System.

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Textpro III has 9 Hi-Resolution Upper/Lower case display formats available, from 28 to 255 characters per line by 24 lines. You also have advanced screen commands such as double size characters and on screen underlining. You can also use the standard 32 by 16 display for systems having lower case hardware kits installed. The display defaults to a 51 by 24 format that is easily switched to any other format available. Along with the Hi-Resolution screen we added automatic repeating keys "Typomatic." The rate is fully adjustable from ultra fast to super slow or can be turned off entirely for your convenience.

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Textpro III fully supports the use of 64K on the Color Computer. It has fast automatic memory sensing and configures itself accordingly. Textpro III does not require Extended Basic or Flex to take full advantage of a 64K RAM system. On a 64K Disk System there is over 64K of workspace available and files larger than memory are fully supported. Tape based systems have up to 48K available for workspace.

Text Editor

Textpro III has a full featured, line oriented screen editor. It supports single or multiple line copy and move, global or local search and replace of any character string, character insert and delete, block delete, adjustable speed automatic key repeat, single and automatic line edit, programmable underline and double width control coded, change screen background color and line lengths, automatic line numbering, line resequencer, and insert and delete line numbers.

Disk & Tape I/O

Textpro III uses fully compatible ASCII formatted files that do not have to be converted like some of the other Word Processing Systems. It will load, save and verify basic ASCII formatted tape files. The disk version supports Load, Save, Directory, Kill, Append, Text Process file from Disk, Roll part of file to disk and get next portion of file from disk.

DISK $59.95 **TAPE $49.95**

Standard Commands

Textpro III features a whole host of Document Formatting commands. The setup command section includes: Line Length, Top, Left, and Bottom Margins, Page Length, Page Numbering on/off and Automatic Word Fill and Justification on/off.

Some of the vertical control features include: test for number of lines left on the page, skip to next page, set page number, wait at top of page, single and multi line spacing, and skip blank lines.

Textpro III features 3 programmable header lines that can be centered, left or right justified. It also has one programmable footer line. 3 commands for continues, single and paragraph indenting, center text, underline and double width print commands.

Footnotes and Special Commands

Some of the special features allow imbedded control codes to access intelligent printer features like; superscript, subscript, change type font and even graphics. You can even imbed control codes within justified text. There is a command that automatically places footnotes at the bottom of the page, which can be very handy for term papers, etc. Another command allows you to display a message on the screen and input text from the keyboard. This text is then printed as if it has been part of the original text, thus you can produce things like a personalized form letter. There is also a repeat command that allows you to repeat an entire document or a part of one as many times as needed up to 255 times. This can be used to produce mailing labels or combined with the previous command to produce a selected number of personalized form letters.

Tab Functions

Textpro III features an elaborate system of tab commands for complete control over column formatting. There are 10 programmable tab stops that can be defined or re-defined at any time in the text file. They can be used with the following tab commands; Center Over Tab Column, Right Justify to Tab Column, Decimal Align Over Tab Column, Left Justify to Tab Column (Normal Tab) and Horizontal Tab. Tab functions may also be used with a numeric tab column position for maximum flexibility. You can also define the Tab Fill Character to any printable character to fill in the blanks with dots, dashes, etc.

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PIPELINE

RADIO SHACK is responding in a big way to third-party vendors who support the TRS-80 line of computers, including our favorite, the CoCo. They are sponsoring a series of "Personal Computer Showcases" in five cities, featuring exhibits by the major software producers, as well as manufacturers of monitors, printers and disk drives. Notable industry leaders will deliver keynote addresses and selected vendors will be conducting seminars.

Each of the Showcases will begin at 9 a.m. and continue through 7 p.m. The dates and location sites are:

• Albert Thomas Hall Houston, TX	Sept. 18-19
• Merchandising Mart Atlanta, GA	Sept. 25-26
• Los Angeles Airport Hilton Los Angeles, CA	Oct. 3-4
• Madison Square Garden Rotunda New York, NY	Oct. 17-18
• Merchandising Mart Expo Center Chicago, IL	Oct. 23-24

As you might guess, THE RAINBOW will be represented, making friends with new CoCo owners and introducing them to the best source of information and programs for their computers on the market.

Vendors will not be permitted to sell products at the Showcases, so it should be an ideal opportunity to go comparison shopping for future purchases. And best of all, free tickets will be made available at Radio Shack Computer Centers in the Showcase areas.

* * *

PACKING THEIR BAGS. Softlaw Corporation, currently headquartered in Minneapolis, Minn., is moving its entire operation to the sunny, beautiful Santa Barbara, Calif. area. Softlaw will now be operating from the "Silicon Beach" town of Goleta, continuing to develop software for TRS-80 and other computers.

Softlaw Corporation's new address is 132 Aero Camino, Goleta, CA 93117. Their WATS order line number, 1-800-328-2737, will remain the same. The customer service number for order status and software questions, however, has been changed to 1-805-968-4364.

* * *

THE UBIQUITOUS BOB ROSEN. New York, California and now Illinois. Spectrum Projects President Bob Rosen has announced that the official midwest distributor for the entire Spectrum line is Midwest Spectrum, P.O. Box 348380, Chicago, IL 60634. No bulletin board — yet — but you can reach them at (312) 736-4405.

* * *

CHEAPER BY THE DOZEN. Holmes & Company, Inc. has announced that they will now sell disks to individuals at the same price previously offered only to buyers for clubs and user groups. These are the same diskettes that are often sold with famous labels at inflated prices. They are certified at the factory and are covered by a disk-for-disk replacement warranty for five years from the date of purchase.

Also being offered, for those of you who are technically minded, is a copy of the ANSI standards that their diskettes conform to. For $1.50 per copy (it's 20 pages long), it should prove fascinating if you're interested in diskette magnetics.

Prices for the disks vary, beginning with SSDD Ten Paks for $14 and DSDD Ten Paks for $19.50. Bulk orders for 25 and up begin at $1.20 each. For a complete price list and order form, write to Holmes & Co., 900 Lafayette Street, #407, Santa Clara, CA 95050, or call (408) 241-1505.

* * *

COLOR AND HARMONY. Jay Hoggins of Harmonycs Co. in Salt Lake City, Utah, and Darren Croft of Color Connection Software have recently announced that they have entered into a marketing partnership. Software formerly marketed by Harmonycs will now be marketed by Color Connection Software, and all direct inquiries should be made to Color Connection Software, 1060 Buddlea Dr., Sandy, UT 84070.

* * *

A GRAPHIC PRESENTATION. The University of Oregon will be holding its Third Annual Pacific Northwest Computer Graphics Conference on October 29 and 30, 1984, in Eugene, Ore., at the Hult Center for the Performing Arts and Conference Center/Hilton complex. The purpose of the two-day event is to provide a multi-disciplinary view of leading edge computer graphics applications.

This year's program features six general session presentations, a trade exposition, a non-commercial exhibit of computer graphics works, and a Monday evening film and video show. In addition, this year's agenda will include 90-minute workshops focusing on applications specific to various fields and a "microcomputing lab" for hands-on demonstrations.

Special rates are available for meals and accommodations and discounts are available for early conference registration. For a full list of fees and information on the general sessions, contact: Conference Manager, University of Oregon Continuation Center, Room 333 Oregon Hall, Eugene, OR 97403; phone (503) 686-4231.

* * *

TV BREAK. After finally purchasing a color monitor for your CoCo, didn't you feel that for that much money, you should be able to receive a television signal? Well, with the new television tuner being offered by the TAXAN Corporation, when you get tired of programming, you can just switch over to *Late Night with David Letterman* for a break. The Model 305 television tuner will convert any brand of composite monitor with audio capability into a television. And, because of the higher CRT quality in monitors, the picture should be much clearer than on most regular televisions.

The unit is currently priced at $129.95. For further information, write to TAXAN Corporation, 18005 Cortney Court, City of Industry, CA 91748, or call (818) 810-1291.

* * *

MOVING ON UP. The Software Connection of Ft. Lauderdale, Fla., has announced that it is moving to a new location with a greatly expanded showroom for their products. They now feature more than 1,000 square feet of space dedicated solely to Color Computer software and peripherals.

So if you've been looking for them and thought they had disappeared, search no longer. Their new address is 4301 North State Road 7, Lauderdale Lakes, FL 33319; (305) 484-7547.

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HIRES - Choice of 32, 51 or 64 characters	NO	YES
ON ERROR GOTO - Traps all errors	NO	YES
RUNM - Load & exec ML files instantly	NO	YES
ECHO - Output to screen and printer	NO	YES
Any type of drive can be added	NO	YES

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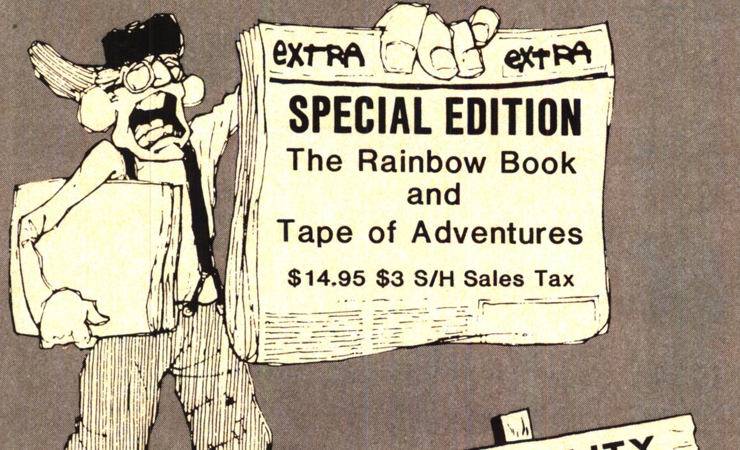
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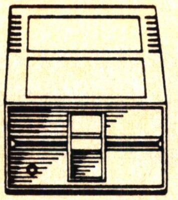

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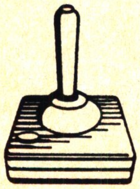

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TUTORIAL

To Pack OR Not To Pack That's An Easy Question

By Burt Witham, Jr.

Just a few days ago, I was taken to task for using packed lines in my programming for publication. I was told that I should use *Pretty Print* or *Neat Print*, or some such program, in order to make the program more readable, that is necessary for novice programmers.

Well, I differ greatly with this position. It is often said by authors and editors that their programs should be a learning experience. The problem is that many programs teach poor programming techniques. One of these is the spreading out of lines for ease of reading. The novice doesn't realize that this is a convenience and actually programs in this manner, even when writing new programs of his own.

Let's just look at the memory requirements for a few examples:

```
10 CLS
20 PRINT@129,"TEST"
30 FORT=1 TO999
40 NEXTT
```

Takes 44 bytes.

```
10 CLS:PRINT@129,"TEST":FORT=1 TO999:NEXTT
```

Takes 34 bytes.

```
10 CLS:PRINT @ 129, "TEST":FOR T=1 TO 999:
NEXT T
```

Even this multiple command line (and not an uncommon way to print a program in computer magazines), is wasteful of memory at 38 bytes.

Every line number takes four bytes, so combining lines can save a considerable amount of RAM in a program. Thus, line packing serves a very useful purpose and often can drop enough bytes to slip a program back into the next gran of a disk and thus save another gran of 2304 bytes! One of the beautiful things about CoCo is the ability to program using multiple command lines. Only one command to a line is permitted on many other computers.

This may seem like a simple matter and of little importance in a short program, but proper techniques are important in short, as well as long, programs. Also, as a teaching technique, I think it is important to have the correct methods shown in a published program. Recently I had a novice user tell me that a 14K program he had typed in for his 16K CoCo would not run. He kept getting an OM Error. His printout looked like this:

```
10 CLS
   :CLEAR 500
   :DIM A$(12)
```

You say, what's wrong with that? Line packing is used. Ah yes, but look carefully at the line. The novice typed it in just as it was presented . . . all the spaces included. It turned out looking like this to the computer:

```
10 CLS                              :CLEAR500
   :DIM A$(12)
```

No wonder that he ran out of memory. But, he was merely doing what he thought was right and was misled by the method of program presentation. Therefore, if the printed program is to use a "neat print" technique, be certain to explain completely that this is for convenience of copying only. Also, be certain to explain that spaces between commands in the same line are used for clarity and should be removed when entering the data. Of course, there are a few rules of BASIC where spaces are required, such as:

```
FORX=1 TO2000
IFX=34 THENGOSUB1000 ELSEGOTO90
IF X<2 OR X>9 THEN20
```

I've seen many programs completely packed with no spaces, but according to the best information that I have (*The Little Book Of BASIC Style*, by Nevison, Addison Wesley, 1978), the examples above will run properly with no problems and packing these will sometimes bomb a program.

Extra spaces use processing time. Also, memory is precious, use it well and wisely!

(Burt Witham, a retired U.S. Navy captain, has published several programs for amateur radio operators in THE RAINBOW. *He holds FCC call sign W4CN2. He also owns Burwith Computer Service Inc., specializing in software development for hams and small businesses.)*

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RAINBOW Info

How To Read Rainbow

Please note that all the BASIC program listings you will find in *the Rainbow* are formatted for a 32-character screen — so they will show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little cassette symbol on listings indicates that program is available through our *Rainbow On Tape* service. An order form for this service is on the insert card bound in the magazine.

RAINBOW
CERTIFICATION
SEAL

The Rainbow Seal

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product which carries the Seal has been physically seen by us and that it does, indeed, exist.

Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to *the Rainbow* for certification. We ascertain that their products are, in actuality, what they purport to be and, upon such determination, award a Seal. This lets you know that we have seen the product and that it does, indeed, exist.

The Seal, however, is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in *the Rainbow* and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

Using Machine Language

Machine Language programs are one of the features of *the Rainbow*. There are a number of ways to "get" these programs into memory so that you can operate them.

The easiest way is by using an Editor-Assembler, a program you can purchase from a number of sources.

An editor-assembler allows you to enter mnemonics into your CoCo and then have the editor-assembler assemble them into specific instructions that are understood by the 6809 chip that controls your computer.

When you use an editor-assembler, all you have to do, essentially, is copy the relevant instructions from *the Rainbow's* listing into CoCo.

Another method of getting an assembly language listing into CoCo is called "hand assembly." As the name implies, you do the assembly by hand. This can *sometimes* cause problems when you have to set up an ORIGIN statement or an EQUATE. In short, you have to know something about assembly to hand assemble some programs.

Use the following program if you wish to hand assemble machine language listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I,VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the &H3F00 in Line 10 to &H7F00.

What's A CoCo

CoCo is an affectionate name which was first given to the TRS-80 Color Computer by its many fans, users and owners. As such, it is almost a generic term for three computers, all of which are very much alike.

When we use the term CoCo, we refer to the TRS-80 Color Computer, the TDP System-100 Computer and the Dragon-32 Computer. It is easier than using the three "given" names throughout *the Rainbow*.

In most cases, when a specific computer is mentioned, the application is for that specific computer. However, since the TDP System-100 and TRS-80 Color are, for all purposes, the same computer in a different case, these terms are almost always interchangable.

Rainbow Check PLUS

The small boxes that you see accompanying programs in the *Rainbow* "Check system," which is designed to help you type in programs accurately.

Rainbow Check PLUS will count the number and values of characters you type in. You can then compare the numbers you get to those printed in *the Rainbow*. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS*, type in the program and *CSAVE* it for later use, then type in the command *RUN* and press [ENTER]. Once the program has run, type *NEW* [ENTER] to remove it from the area where the program you're typing in will go.

Now, whenever you press the down arrow key, your CoCo will give you a checksum based on the length and content of the program in memory. This is to check against the numbers printed in *the Rainbow*. If your number is different, check the listing carefully to be sure that you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on page 21 of the February 1984 *Rainbow*.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR25,X-1
30 X=256*PEEK(35)+178
40 FOR Z=X TOX+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182,1,106,167,140,60,134
100 DATA 126,183,1,106,190,1,107
110 DATA 175,140,50,48,140,4,191
120 DATA 1,107,57,129,10,38,38
130 DATA 52,22,79,158,25,230,129
140 DATA 39, 12, 171,128,171,128
150 DATA 230,132,38,250,48,1,32
160 DATA 240,183,2,222,48,140,14
170 DATA 159,166,166,132,28,254
180 DATA 189,173,198,53,22,126,0
190 DATA 0,135,255,134,40,55
200 DATA 51,52,41,0
```

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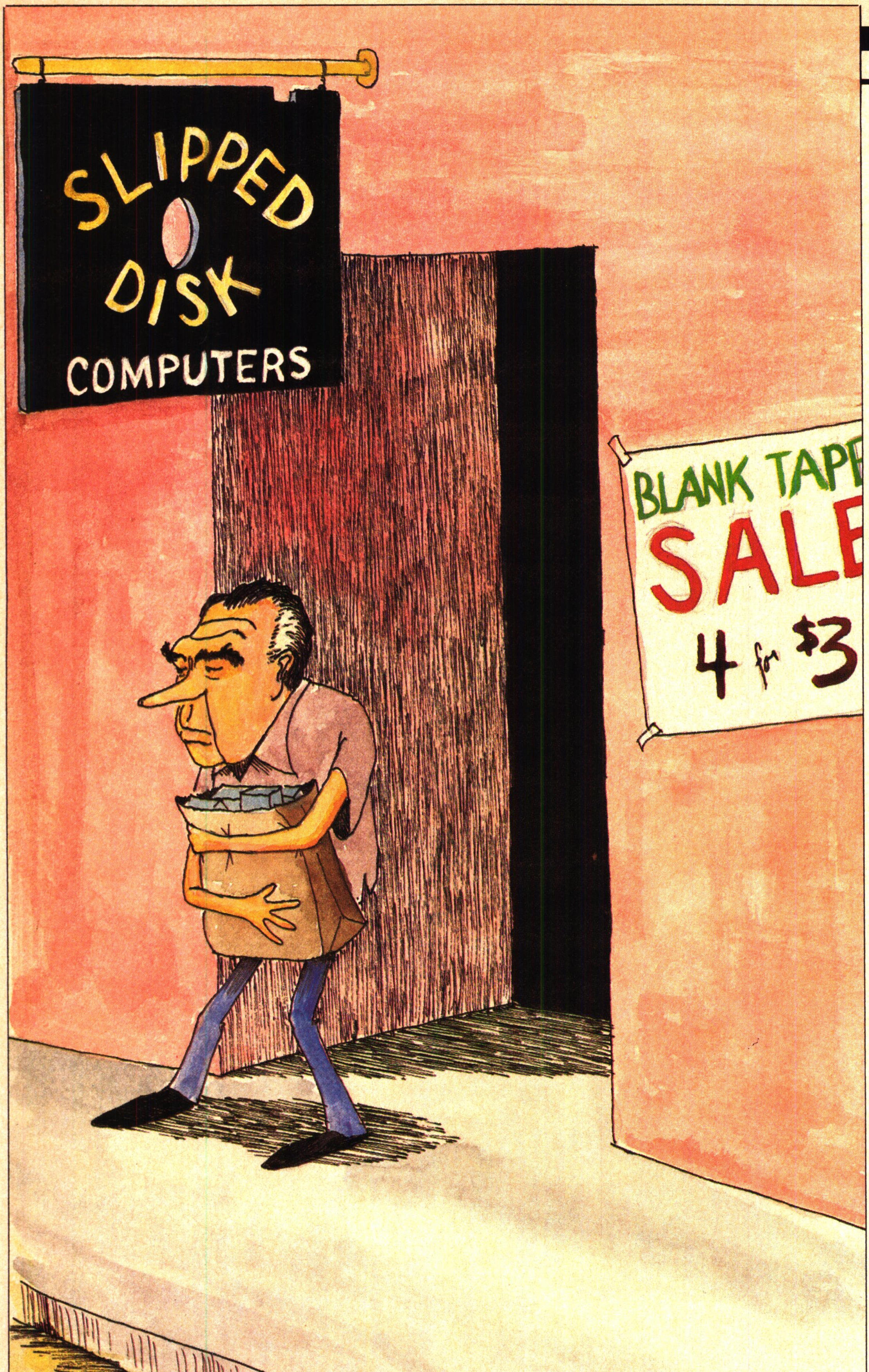

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HAIL TO THE CHIEFS

In Pursuit Of Presidential Trivia

By Mike Knolhoff

Once again it's time for that political circus we call a presidential election. By now we all know who is running for each party, and many of us have formed an opinion as to whom our next president will be. This year marks the 49th time our country has had a presidential election.

Since that first election in 1788, we have had 40 different presidents. It is easy to remember those presidents whose terms of office occurred during our lifetimes, but who was our 12th president? Do you know who was president in 1888? To what political party did John Tyler belong? Who was the only bachelor president? If you do not know the answer to these questions and would like to have some fun learning about our past presidents, *Presidents* will be of interest to you.

If you have a 32K or 64K CoCo, simply type in the program as it is. If you have 16K you should refer to Table 1 to delete certain areas of the program. You must still *PCLEAR 2* before you type in or load the modified program with 16K. The program does not use the speed-up poke, but it does use *POKE 359,60* to allow horizontal scrolling. This poke cannot be used on a disk-based system. Disk users can either unplug your controllers or delete *POKE 159,60* in Lines 20, 100, 120, and 1010 and delete *POKE 159,126* in Lines 120, 600, and 1010.

Instructions for the program are quite simple. The program is in quiz game format and allows for one to four players. After entering the names of the players, there will be 12 rounds of questions. (This could be modified in Line 115.) If a player answers the question correctly he will receive a score of 25 to 100 points, based on the type of question he answered and a random factor. If a player's answer is spelled incorrectly but is close, he will get one more chance to correctly spell his answer.

When a player correctly answers three questions in a row, he will enter the bonus round. With 16K the player will simply score a random number of points between 50 and 100. With 32K the player goes to a special bonus screen. There he must correctly answer a presidential trivia question worth from 100 to 200 points. No spelling mistakes are allowed on the bonus questions, so be careful typing in answers here. After the 12 rounds of questions are completed, the final scores are recapped and the high score, whether a new score or a previous score, will be displayed.

(Mike Knolhoff is a science teacher who enjoys writing educational programs for his students and family. He resides in Sterling, Ill. with his wife, Sharon, and their three children.)

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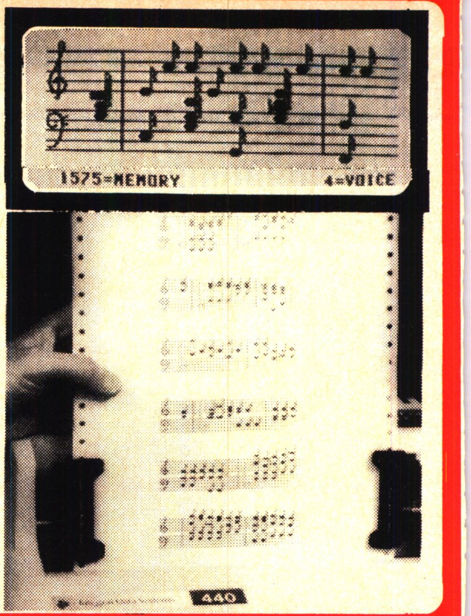

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100	32
200	1
400	10
550	111
800	165
900	19
1130	84
1330	188
2090	89
2228	254
2268	114
2310	249
2324	74
2340	149
END	168

Table 1 — 16K Modifications

1) Delete the following data lines:
2040 - 2110 and 2300 - 2355

2) Delete the following lines:
15, 55, 65, 1010 - 1130

3) Add the following lines:
1010 BS=RND(50)+49:PRINT@106,"BONUS SCORE";

1020 FOR X=ITO BS:PRINT@269,X;:SOUND125+X,1:
NEXTX

1030 FOR X=1TO8:PRINT@270," ";:FORK=1TO100:
NEXTK

1040 PRINT@269,BS;:FORK=1TO200:NEXTK:NEXTX

1050 S(PL)=S(PL)+BS:RETURN

The listing:

```
0 ' ******************
1 '     PRESIDENTS
2 '   BY MIKE KNOLHOFF
3 ' STERLING, IL 61081
4 '   DECEMBER 1983
5 ' ******************
6 CLS:R=RND(-TIMER)
10 DIM L$(40),F$(40),P$(40),T$(4
0),ST$(40),R$(40),T(128)
15 DIM B$(75),BA(75),BS(224)
20 POKE359,60
25 P1$="O2L255T255V31"
30 CLS0:PRINT@232," PRESENTING..
. ";
50 GOSUB600:FORX=1TO128:READT(X)
:NEXTX
55 FORX=1TO224:READBS(X):NEXTX
60 FORX=1TO40:READL$(X),F$(X),R$
(X),P$(X),T$(X),ST$(X):NEXTX:GOS
UB750
65 FORX=1TO75:READB$(X),BA(X):NE
XTX
70 FORX=1TO4:S(X)=0:NEXTX
90 CLS
100 PRINT:POKE359,60:INPUT" HOW
MANY PLAYERS (LIMIT 4)";P:IFP<1
OR P>4 OR INT(P)<>P THENPRINT"IN
VALID NUMBER.":GOTO100
110 PRINT:FORX=1TO P:PRINT"NAME
OF PLAYER"X;:INPUTN$(X):IF LEN(N
$(X))>9THEN N$(X)=LEFT$(N$(X),9)
:NEXTX:ELSENEXTX
115 FOR RO=1TO12:FORPL=1TO P
120 POKE 359,126:CLS:FORX=1TO128
:PRINTCHR$(T(X));:NEXTX:POKE359,
60
130 PRINT@307,"scoreboard";
140 PRINT@369,N$(1):PRINT@379,S(
1)
150 IFP>1THENPRINT@401,N$(2):PRI
NT@411,S(2)
160 IFP>2THENPRINT@433,N$(3):PRI
NT@443,S(3)
170 IFP>3THENPRINT@465,N$(4):PRI
NT@475,S(4);
180 PLAY P1$+"O5GT4P8T255O3G"
190 R=RND(40):Q=RND(6):ON Q GOTO
200,250,300,350,400,450
200 PRINT@160,N$(PL)", WHAT IS T
HE FIRST":PRINT"NAME OF "L$(R)",
 OUR "R$(R):PRINT"PRESIDENT?"
210 CA$=F$(R):GOSUB500
220 NEXT PL
230 NEXT RO:GOTO1200
250 PRINT@160,N$(PL)", WHAT IS T
HE LAST NAME":PRINT"OF OUR "R$(R
)" PRESIDENT?";
260 CA$=L$(R):GOSUB500
270 NEXT PL
280 NEXT RO:GOTO1200
300 PRINT@160,N$(PL)", WHAT IS T
HE LAST NAME":PRINT"OF THE PRESI
DENT WHOSE TERM OF":PRINT"OFFICE
 WAS "T$(R)"?";
310 CA$=L$(R):GOSUB500
320 NEXT PL
330 NEXT RO:GOTO1200
350 PRINT@160,N$(PL)", IN WHICH
STATE OR":PRINT"STATE TO BE WAS
"F$(R):PRINTL$(R)" BORN?";
360 CA$=ST$(R):GOSUB500
370 NEXT PL
380 NEXT RO:GOTO1200
400 PRINT@160,N$(PL)", WHICH PRE
SIDENT":PRINT"(1-40) WAS "F$(R)"
 "L$(R)"?"
410 IF R<10 THEN CA$=LEFT$(R$(R)
,1)ELSE CA$=LEFT$(R$(R),2)
420 GOSUB500
430 NEXT PL
440 NEXT RO:GOTO1200
```

```
450 PRINT@257,"1 FEDERALIST";:PR
INT@289,"2 REPUB/DEMO";:PRINT@32
1,"3 WHIG";:PRINT@353,"4 DEMOCRA
T";:PRINT@385,"5 REPUBLICAN";
460 PRINT@160,N$(PL)", TO WHAT P
OLITICAL":PRINT"PARTY DID "F$(R)
" "L$(R):PRINT"BELONG?";
470 CA$=P$(R):GOSUB500
480 NEXT PL
490 NEXT RO:GOTO1200
500 IF Q=6THEN LINEINPUT A$ ELSE
 PRINT@256,"";:LINEINPUT A$
510 IFA$=CA$THENPLAYP1$+"O5CBCBC
BCBCBCBC":SP=0:GOTO800
514 IF Q=5 AND CA$="22" AND A$="
24" THEN800
516 IF Q=5 AND CA$="24" AND A$="
22" THEN800
520 IF Q=5OR Q=6 THEN950
525 IF SP=1THEN SP=0:GOTO950
530 IF LEFT$(CA$,2)=LEFT$(A$,2)O
R RIGHT$(CA$,2)=RIGHT$(A$,2)THEN
PRINT@320,"CHECK YOUR";:PRINT@35
2,"SPELLING AND";:PRINT@384,"TRY
 AGAIN.";:ELSE GOTO950
540 PLAY P1$+"O3":FORX=1TO5:PLAY
"T4P4T255D":NEXTX:SP=1:PRINT@288
,"";:LINEINPUTA$
550 GOTO510
600 POKE359,126:PMODE1,1:PCLS1:S
CREEN0
620 COLOR3,1:LINE(29,15)-(224,55
),PSET,BF
630 COLOR4,1:FORX=29TO209STEP15:
LINE(X,55)-(X+15,175),PSET,B:NEX
TX
640 FORX=35TO220STEP30:PAINT(X,1
00),4,4:NEXTX
650 FORX=50TO205STEP30:PAINT(X,1
00),2,5:NEXTX
660 COLOR3,1:LINE(29,135)-(128,1
75),PSET:LINE-(225,135),PSET:LIN
E(29,15)-(29,135),PSET:LINE(225,
15)-(225,135),PSET
670 PAINT(10,10),2,3:PAINT(10,10
),1,3
680 DRAW"BM33,25C1D20U10R15U10L1
5BR20ND20R15D10L15R5F10BR5BU20NR
15D10NR10D10R15BR5BU20NR15D10R15
D10NL15BR5BU20R8L4D20L4R8BR5BU20
D20R10E5U10H5L10BR20NR15D10NR10D
10R15BR5BU20ND20D2F15D3U20BR5R7N
D20R7BR5NR15D10R15D10L15"
690 SCREEN1,1:RETURN
750 PA$="V30L2T3O3GL4.AL8BO4L2CL
4.O3BL8AL4.GL8AL4.GL8EL2DC"
760 PB$="V30T3O3L2GO4L4.CL8DL2EL
4.DL8CL4.DL8CL4DEDCO3BA"
```

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```
770 PC$="V30T3O3L2GL4.O4CO3L8BL4
AO4CO3GFL2EDL2.C"
780 PLAY PA$+PB$:PLAYPA$+PC$
790 RETURN
800 IF Q<2 OR Q>3THEN 900
805 BK$=STRING$(12," "):PRINT@32
0,BK$;:PRINT@352,BK$;:PRINT@384,
BK$;
810 IF R=2OR R=6THENPRINT@288,"W
HICH ONE: JOHN";:PRINT@320,"OR J
OHN QUINCY?";:ELSE GOTO830
820 PRINT@352,"";:LINEINPUT D$:I
FD$=F$(R)THEN900ELSE CA$=F$(R):G
OTO950
830 IF R=9OR R=23THENPRINT@288,"
WHICH ONE:";:PRINT@320,"BENJAMIN
 OR";:PRINT@352,"WILLIAM?";:ELSE
 GOTO850
840 PRINT@384,"";:LINEINPUTD$:IF
 D$=F$(R)THEN900ELSE CA$=F$(R):G
OTO950
850 IF R=17OR R=36THENPRINT@288,
"WHICH ONE: ANDREW";:PRINT@320,"
OR LYNDON?";:ELSE GOTO870
860 PRINT@352,"";:LINEINPUTD$:IF
D$=F$(R)THEN900 ELSE CA$=F$(R):G
OTO950
870 IF R=26 OR R=32THENPRINT@288
,"WHICH ONE:";:PRINT@320,"THEODO
RE OR";:PRINT@352,"FRANKLIN";:EL
SEGOTO900
880 PRINT@384,"";:LINEINPUTD$:IF
 D$=F$(R)THEN900ELSE CA$=F$(R):G
OTO950
900 SC=RND(25)+25:PLAY P1$+"O5CD
EFGAB"
910 IF Q=2OR Q=3OR Q=5 THEN SC=S
C+50 ELSE IF Q=4 OR Q=6 THEN SC=
SC+25
920 S(PL)=S(PL)+SC:PRINT@480,"CO
RRECT! YOU GET"SC"POINTS";
925 FORX=1TO1200:NEXTX
930 B(PL)=B(PL)+1:IFB(PL)=3THEN1
000ELSE RETURN
940 RETURN
950 PRINT@448,"WRONG ANSWER";:B(
PL)=0:PLAY P1$:FORX=1TO30:PLAY"C
":NEXTX
952 IFQ<>6 THEN 960
954 IF CA$="1"THEN CA$="1 FEDERA
LIST"ELSE IF CA$="2"THEN CA$="2
REPUB/DEMO"ELSE IF CA$="3"THEN C
A$="3 WHIG"ELSE IF CA$="4"THEN C
A$="4 DEMOCRAT"ELSE CA$="5 REPUB
LICAN"
960 FORK=1TO6
970 PRINT@480,CA$;:FORX=1TO200:N
EXTX:PRINT@480,STRING$(16," ");:
FORX=1TO50:NEXTX
980 NEXT K
990 RETURN
1000 B(PL)=0:FORX=0TO8:CLS(X):SO
=RND(50):FORK=0TO200STEP50:SOUND
 SO+K,1:NEXTK:NEXTX:CLS0
1010 POKE359,126:FORX=1TO224:PRI
NTCHR$(BS(X));:NEXT X:POKE359,60
1020 PRINT@256,N$(PL)":";
1030 I=RND(75):PRINT@288,B$(I);
1040 PRINT@384,"";:LINEINPUT"YOU
R ANSWER: ";A$
1050 IF A$=L$(BA(I))THEN1100
1060 PRINT@453,"BETTER LUCK NEXT
 TIME";:PRINT@484,"CORRECT ANSWE
R: "L$(BA(I));
1070 PLAY"T2O2V31L4CFGP128L4.GL8
AP128L2.A":FORK=1TO800:NEXTK
1080 RETURN
1100 FORX=1TO4:PRINT@456,"THAT'S
 RIGHT!!";:FORK=1TO100:NEXTK:PRI
NT@456,"that's right!!";:PLAY"T2
5O3CO4CO5CO4C":FORK=1TO100:NEXTK
:NEXTX
1110 Q=RND(100)+100:PRINT@485,"Y
OU SCORE"Q"POINTS";:S(PL)=S(PL)+
Q
1120 PLAY PA$
1130 RETURN
```

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```
1200 CLS5:PRINT@72," FINAL SCORE
S ";
1210 PRINT@135," ";N$(1);" ";:PR
INT@147,S(1);
1220 IF P>1THEN PRINT@167," ";N$
(2);" ";:PRINT@179,S(2);
1230 IF P>2THEN PRINT@199," ";N$
(3);" ";:PRINT@211,S(3);
1240 IF P>3THEN PRINT@231," ";N$
(4);" ";:PRINT@243,S(4);
1250 OL=HI:FORX=1TO4:IF S(X)>HI
THEN HI=S(X):HI$=N$(X):NEXTX:ELS
E NEXTX
1260 IF HI<>OL THEN PRINT@295,"
NEW HIGH SCORE!! ";ELSE PRINT@29
4,"HIGH SCORE IS STILL ";
1270 FOR X=1TO10:PRINT@359,STRIN
G$(18," ");:FORK=1TO50:NEXTK:PRI
NT@359," ";HI$;" ";:PRINT@371,HI
;:FORK=1TO150:NEXTK:NEXTX
1280 PRINT@486," ANOTHER GAME (Y
/N)? ";
1290 I$=INKEY$:IFI$="N"THEN CLS:
END ELSE IF I$<>"Y"THEN1290
1300 PRINT@486," SAME PLAYERS (Y
/N)? ";
1310 I$=INKEY$:IFI$<>"Y"AND I$<>
"N"THEN1310
1320 FORX=1TO4:S(X)=0:B(X)=0:NEX
TX
1330 IFI$="Y"THEN115ELSE CLS:PRI
NT:PRINT:GOTO 100
1990 REM PRESIDENTS TITLE
2000 DATA 143,140,140,141,140,14
0,141,140,140,141,140,140,141,14
0,140,141,140,140,143,140,140,14
1,141,143,141,140,140,141,140,14
0,141,143
2010 DATA 143,133,143,133,133,14
3,133,133,143,143,133,143,143,14
3,133,143,133,143,133,133,143,14
3,128,141,133,143,133,143,133,14
3,143,143
2020 DATA 143,129,131,135,129,12
9,135,129,131,143,131,131,133,14
3,133,143,133,143,133,129,131,14
3,133,132,133,143,133,143,131,13
1,133,143
2030 DATA 143,133,143,143,133,13
9,141,132,140,141,140,140,133,14
0,132,141,132,140,135,132,140,14
1,133,139,133,143,133,143,140,14
0,133,143
2040 REM BONUS
2050 DATA 128,255,255,255,255,12
8,128,128,175,175,175,128,128,20
7,128,128,128,207,128,143,128,12
8,128,143,128,128,159,159,159,15
9,128,128
2060 DATA 128,255,128,128,128,25
5,128,175,128,128,128,175,128,20
7,207,128,128,207,128,143,128,12
8,128,143,128,159,128,128,128,12
8,128,128
2070 DATA 128,255,128,128,128,25
5,128,175,128,128,128,175,128,20
7,207,207,128,207,128,143,128,12
8,128,143,128,159,128,128,128,12
8,128,128
2080 DATA 128,255,255,255,255,12
8,128,175,128,128,128,175,128,20
7,128,207,128,207,128,143,128,12
8,128,143,128,128,159,159,159,12
8,128,128
2090 DATA 128,255,128,128,128,25
5,128,175,128,128,128,175,128,20
7,128,207,207,207,128,143,128,12
8,128,143,128,128,128,128,128,15
9,128,128
```

```
2100 DATA 128,255,128,128,128,25
5,128,175,128,128,128,175,128,20
7,128,128,207,207,128,143,128,12
8,128,143,128,128,128,128,128,15
9,128,128
2110 DATA 128,255,255,255,255,12
8,128,128,175,175,175,128,128,20
7,128,128,128,207,128,128,143,14
3,143,128,128,159,159,159,159,12
8,128,128
2200 DATA WASHINGTON,GEORGE,1ST,
1,1789-1797,VIRGINIA
2202 DATA ADAMS,JOHN,2ND,1,1797-
1801,MASSACHUSETTS
2204 DATA JEFFERSON,THOMAS,3RD,2
,1801-1809,VIRGINIA
2206 DATA MADISON,JAMES,4TH,2,18
09-1817,VIRGINIA
2208 DATA MONROE,JAMES,5TH,2,181
7-1825,VIRGINIA
2210 DATA ADAMS,JOHN QUINCY,6TH,
2,1825-1829,MASSACHUSETTS
2212 DATA JACKSON,ANDREW,7TH,4,1
829-1837,SOUTH CAROLINA
2214 DATA VAN BUREN,MARTIN,8TH,4
,1837-1841,NEW YORK
2216 DATA HARRISON,WILLIAM,9TH,3
,1841,VIRGINIA
2218 DATA TYLER,JOHN,10TH,3,1841
-1845,VIRGINIA
```

TALKHEAD

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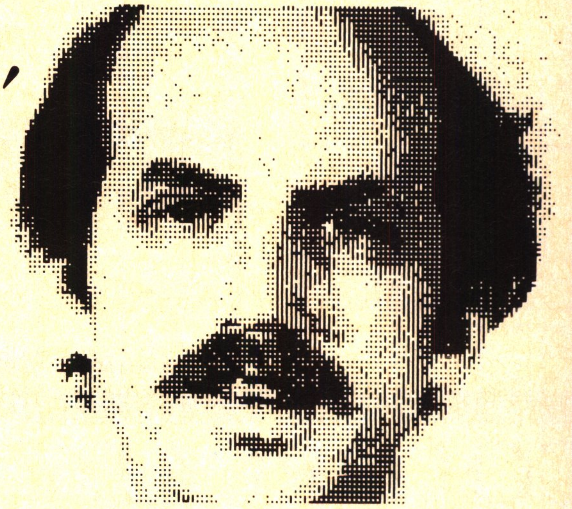

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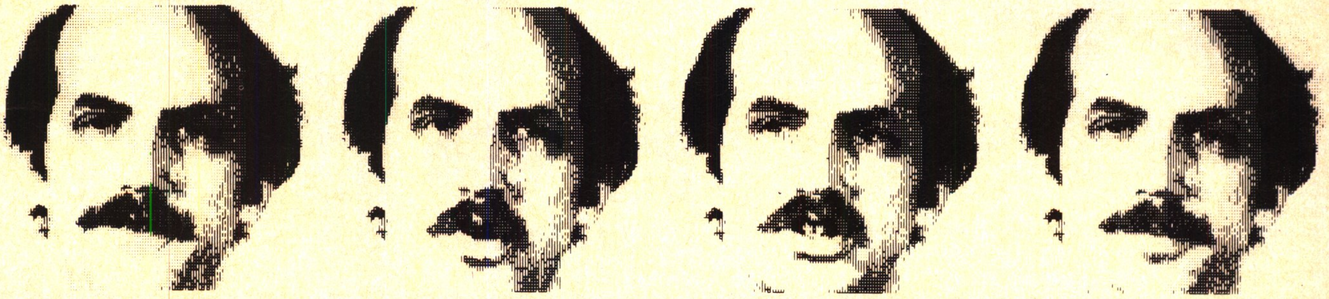

'TALKHEAD's eyes, mouth and jaw move, realistically animating his speech. The effect is amazing!

MORE SOFTWARE FOR THE 'REAL TALKER' VOICE PAK

STELLAR SEARCH ADVENTURE

If you ever had an urge to command the USS Enterprise, this talking version of 'STELLAR SEARCH' from Owl-Ware is for you! It uniquely combines the best aspects of 'adventure' and graphic 'action' type games and puts the 'Real Talker' voice pak to good use. You'll find graphics galore in this exciting package containing more than 86K of action adventure. Requires 32K and a 'Real Talker' voice pak. ***Cassette....$24.95. Disk....$26.95***

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ADVENTURE STARTER

The popular 'ADVENTURE STARTER' from Owl's Nest Software is now available in a speaking version for the 'Real Talker' voice tynthesizer. Adventure Starter is a painless and enjoyable way to learn about computer adventure games. Included are two adventures. The first is "MYHOUSE", an easy game with plenty of help and hints. A second adventure, 'PIRATES', is more challenging. Both are great fun for the adventure minded. This is the only way to get into CoCo adventuring! Requires 16K Extended Basic and a 'REAL TALKER' voice pak. ***Cassette, only $17.95.***

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Woodhaven, NY 11421
(212) 647-2864

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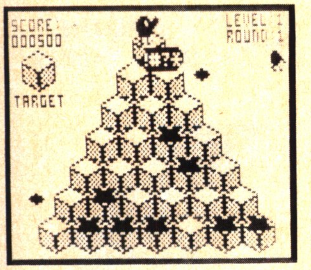
ALL SOFTWARE ON THIS PAGE REQUIRES A COLORWARE 'REAL TALKER' VOICE PAK.

THE TOP 4 COCO GAMES...

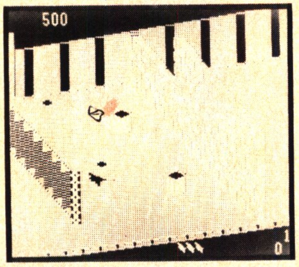


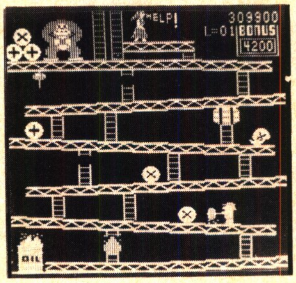
CUBIX

By Spectral Associates. Very much like the arcade smash! Jump little Cubix around the 3D maze trying to change the color of all the squares. With Death Globes, Discs, Snakes, etc. 32K Tape: $24.95

ZAKSUND

From Elite Software comes this fantastic arcade style space action game with 3 different stages of moving 3-D graphics. You've never seen anything like this on your CoCo! Great sound too! 32K Tape: $24.95



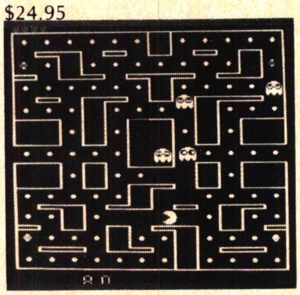


THE KING

Previously called 'Donkey King', you simply cannot buy a more impressive game for your CoCo. With 4 different screens and loads of fun! From Tom Mix Software. 32K Tape: $25.95

GHOST GOBBLER

From Spectral Assoc. This "PAC" theme game has been improved several times. It is definitely the best of its type. Brilliant color, action and sound, just like an arcade. 16K Tape: $24.95



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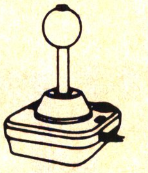
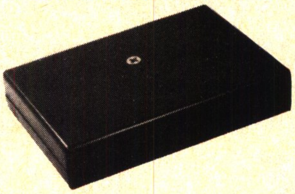


WICO FAMOUS "RED BALL"

ROM/ PROJECT/ PRODUCT CASE



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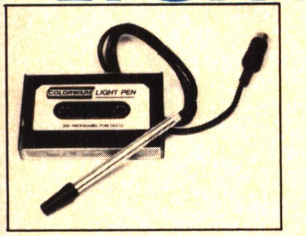
COLORWARE LIGHT PEN



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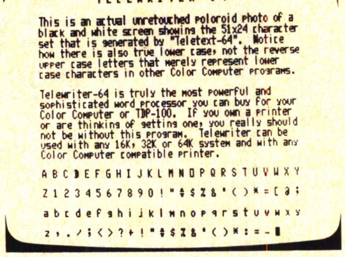
WITH SIX FREE PROGRAMS ON CASSETTE!

The Colorware Light Pen plugs directly into your joystick port and comes with six fun & useful programs on cassette. Easy instructions show how to use it with Basic and it's compatible with light pen software such as Computer Island's "Fun Pack." Order yours today. Only $19.95 complete.

TELEWRITER-64



```
TELEWRITER-64

This is an actual unretouched poloroid photo of a
black and white screen showing the 51x24 character
set that is generated by "Teletext-64".  Notice
how there is also true lower case, not the reverse
upper case letters that merely represent lower
case characters in other Color Computer programs.

Telewriter-64 is truly the most powerful and
sophisticated word processor you can buy for your
Color Computer or TDP-100.  If you own a printer
or are thinking of getting one, you really should
not be without this program.  Telewriter can be
used with any 16K, 32K or 64K system and with any
Color Computer compatible printer.

A B C D E F G H I J K L M N O P Q R S T U V W X Y
Z 1 2 3 4 5 6 7 8 9 0 ! " # $ % & ' ( ) * = [ @ ;
a b c d e f g h i j k l m n o p q r s t u v w x y
z , . / ; < > ? + ! " # $ % & ' ( ) * : = - █
```

DISK $59.95
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Colorware researched the word processors available for the Color Computer. This is the best. Telewriter-64 is a truly sophisticated system that is marvelously easy to use. It works with any 16K, 32K or 64K system and any CoCo compatible printer.

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READ THIS....

Making your computer talk couldn't be any easier! 'Real Talker' is a full featured, ready to use, HARDWARE voice synthesizer system in a cartridge pak. It uses the Votrax SC-01 phoneme synthesizer chip to produce a clear, crisp voice.

FREE TEXT-TO-SPEECH

Included free with 'Real Talker' is Colorware's remarkable Text-to-Speech program. This is a truly powerful machine language utility. What it does is automatically convert plain English to speech. And it has an unlimited vocabulary! For example, use it in the direct mode: Type in a sentence or a paragraph, even mix in numbers, dollar signs, etc., then press enter. The text is spoken. At the same time a phoneme string is generated which can be saved to cassette or disk, modified or used in a Basic program.

We originally planned to sell this major piece of programming for about $40.00 but decided it was so useful that no 'Real Talker' user should be without it. Besides, it really shows off the capability of 'Real Talker'.

Also included with 'Real Talker' is our unique Phoneme Editor program. It allows you to explore and create artificial speech at the phoneme level. Phenomes are the fundimental sounds or building blocks of word pronunciation. There are 64 different phenomes, as well as 4 inflection levels at your disposal. Creating and modifying speech at the phenome level is both fascinating and educational. The Phenome Editor may also be used to customize the pronunciation of speech produced by the Text-to-Speech program.

You don't have to use any of our utility programs though. If you write your own Basic Programs, you will find the pocket sized Votrax Dictionary (included free) is all you need to make your own Basic programs talk. This dictionary gives you quick access to the phenome sequences used to create approximately 1400 of the most used words in the English language.

How about compatibility? 'Real Talker' is compatible with any 16K, 32K, 64K, Extended or non-extended Color Computer. It works with any cassette or disk based system, with or without the Radio Shack Multi-slot expander. No other synthesizer under $100 can make this claim. Most other CoCo voice synthesizers require an expensive Multi-slot expander in order to work with the disk system. 'Real Talker' requires only an inexpensive Y-adapter. This is an important consideration if you plan on adding a disk or have one already.

'Real Talker' comes completely assembled, tested and ready to use. It is powered by the CoCo and talks through your T.V. speaker so there is nothing else to add. Price includes Text-to-Speech and other programs on cassette (may be transferred to disk), User Manual and Votrax Dictionary. ONLY $59.95

'Y-BRANCHING CABLE' For disk systems. This 40-pin, 3 connector cable allows 'Real Talker' to be used with any disk system $29.95

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```
2220 DATA POLK,JAMES,11TH,4,1845
-1849,NORTH CAROLINA
2222 DATA TAYLOR,ZACHARY,12TH,3,
1849-1850,VIRGINIA
2224 DATA FILLMORE,MILLARD,13TH,
3,1850-1853,NEW YORK
2226 DATA PIERCE,FRANKLIN,14TH,4
,1853-1857,NEW HAMPSHIRE
2228 DATA BUCHANAN,JAMES,15TH,4,
1857-1861,PENNSYLVANIA
2230 DATA LINCOLN,ABRAHAM,16TH,5
,1861-1865,KENTUCKY
2232 DATA JOHNSON,ANDREW,17TH,4,
1865-1869,NORTH CAROLINA
2234 DATA GRANT,ULYSSES,18TH,5,1
869-1877,OHIO
2236 DATA HAYES,RUTHERFORD,19TH,
5,1877-1881,OHIO
2238 DATA GARFIELD,JAMES,20TH,5,
1881,OHIO
2240 DATA ARTHUR,CHESTER,21ST,5,
1881-1885,VERMONT
2242 DATA CLEVELAND,GROVER,22ND,
4,1885-1889,NEW JERSEY
2244 DATA HARRISON,BENJAMIN,23RD
,5,1889-1893,OHIO
2246 DATA CLEVELAND,GROVER,24TH,
4,1893-1897,NEW JERSEY
2248 DATA MCKINLEY,WILLIAM,25TH,
5,1897-1901,OHIO
2250 DATA ROOSEVELT,THEODORE,26T
H,5,1901-1909,NEW YORK
2252 DATA TAFT,WILLIAM,27TH,5,19
09-1913,OHIO
2254 DATA WILSON,WOODROW,28TH,4,
1913-1921,VIRGINIA
2256 DATA HARDING,WARREN,29TH,5,
1921-1923,OHIO
2258 DATA COOLIDGE,CALVIN,30TH,5
,1923-1929,VERMONT
2260 DATA HOOVER,HERBERT,31ST,5,
1929-1933,IOWA
2262 DATA ROOSEVELT,FRANKLIN,32N
D,4,1933-1945,NEW YORK
2264 DATA TRUMAN,HARRY,33RD,4,19
45-1953,MISSOURI
2268 DATA EISENHOWER,DWIGHT,34TH
,5,1953-1961,TEXAS
2270 DATA KENNEDY,JOHN,35TH,4,19
61-1963,MASSACHUSETTS
2272 DATA JOHNSON,LYNDON,36TH,4,
1963-1969,TEXAS
2274 DATA NIXON,RICHARD,37TH,5,1
969-1974,CALIFORNIA
2276 DATA FORD,GERALD,38TH,5,197
4-1977,NEBRASKA
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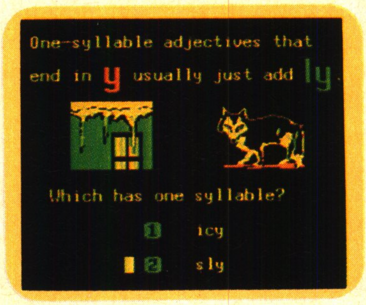
Which?
1 sister
2 smaller


One-syllable adjectives that end in y usually just add ly.
Which has one syllable?
1 icy
2 sly

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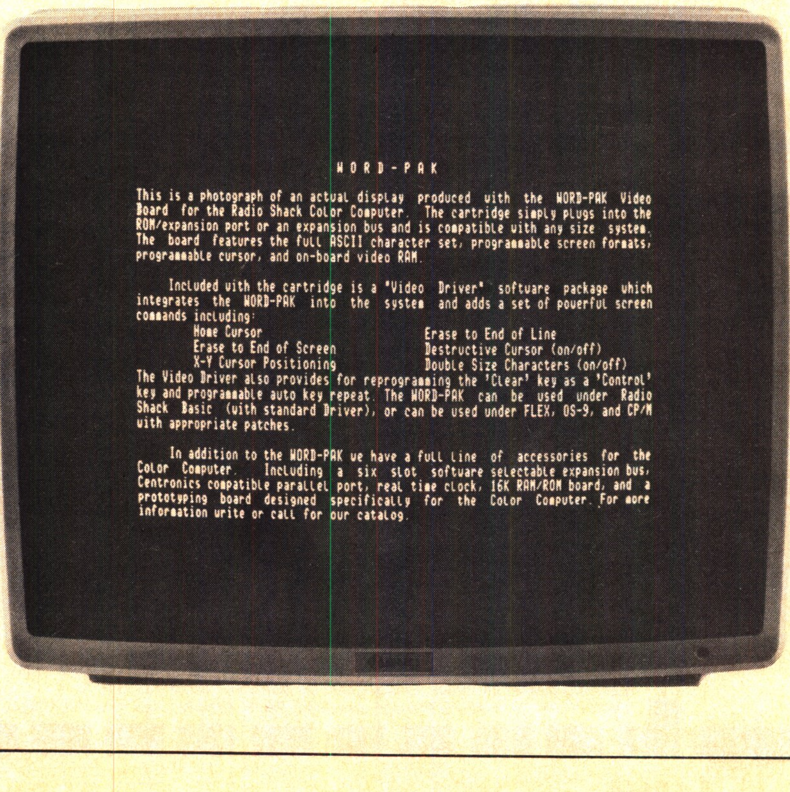
```
2278 DATA CARTER,JAMES,39TH,4,19
77-1981,GEORGIA
2280 DATA REAGAN,RONALD,40TH,5,1
981-PRESENT,ILLINOIS
2300 DATA WHO WAS COMMANDER IN C
HIEF OF   THE FIRST CONTINENTAL
ARMY?,1,WHO HAD FALSE TEETH MADE
 FROM   RHINOCEROUS IVORY?,1,WHO
 WAS THE ONLY PRESIDENT TO BEELE
CTED UNANIMOUSLY?,1
2302 DATA WHICH PRESIDENT COULD
READ SEVENLANGUAGES?,2,WHICH PRE
SIDENT LIVED THE       LONGEST?,
2,WHO DIED ON JULY 4TH SHORTLY
  AFTER JEFFERSON DIED?,2
2304 DATA WHO BOUGHT THE LOUISIA
NNA      PURCHASE?,3,WHICH PRES
IDENT'S HOUSE WAS     NAMED MONT
ICELLO?,3,WHO WROTE THE DECLARAT
ION OF    INDEPENDENCE?,3
2306 DATA WHO WAS THE FIRST PRES
IDENT TO  WEAR LONG TROUSERS?,4,
WHO WAS LIVING IN THE WHITE
HOUSE WHEN IT WAS DESTROYED BY
THE BRITISH?,4
2308 DATA WHO WAS THE FIRST PRES
IDENT TO  SAIL ON A STEAMSHIP?,5
,WHICH PRESIDENT'S FATHER WAS
 ALSO A PRESIDENT?,6,WHICH PRESI
DENT WAS ALSO A      PUBLISHED P
OET?,6
2310 DATA WHO WAS THE FIRST PRES
IDENT TO  RIDE A RAILROAD TRAIN
WHILE IN  OFFICE?,7,WHICH PRESID
ENT WAS THE VICTIM  OF THE FIRST
 ASSASINATION       ATTEMPT?,7,W
HOSE HOUSE WAS CALLED THE      H
ERMITAGE?,7
2312 DATA WHO WAS THE FIRST PRES
IDENT TO  BE BORN IN THE UNITED
STATES?,8,WHO WAS THE FIRST PRES
IDENT TO  DIE WHILE IN OFFICE?,9
,WHICH PRESIDENT HAD THE SHORTES
TTERM (1 MONTH)?,9
2314 DATA WHICH PRESIDENT HAD TH
E MOST    (14) CHILDREN?,10,WHO
WAS THE FIRST PRESIDENT TO  HAVE
 IMPEACHMENT PROCEEDINGS    STAR
TED AGAINST HIM?,10,WHICH PRESID
ENT HAD GAS LIGHTS  INSTALLED IN
 THE WHITE HOUSE?,11
2316 DATA WHO WAS THE ONLY SPEAK
ER OF THE HOUSE TO BECOME PRESID
ENT?,11,WHO DIED IN OFFICE AS A
RESULT  OF DRINKING COLD MILK AF
TER EAT-ING CHERRIES ON A HOT DA
```

A PICTURE IS WORTH . . .



W O R D - P A K

This is a photograph of an actual display produced with the WORD-PAK Video Board for the Radio Shack Color Computer. The cartridge simply plugs into the ROM/expansion port or an expansion bus and is compatible with any size system. The board features the full ASCII character set, programmable screen formats, programmable cursor, and on-board video RAM.

Included with the cartridge is a "Video Driver" software package which integrates the WORD-PAK into the system and adds a set of powerful screen commands including:

Home Cursor — Erase to End of Line
Erase to End of Screen — Destructive Cursor (on/off)
X-Y Cursor Positioning — Double Size Characters (on/off)

The Video Driver also provides for reprogramming the 'Clear' key as a 'Control' key and programmable auto key repeat. The WORD-PAK can be used under Radio Shack Basic (with standard Driver), or can be used under FLEX, OS-9, and CP/M with appropriate patches.

In addition to the WORD-PAK we have a full line of accessories for the Color Computer. Including a six slot software selectable expansion bus, Centronics compatible parallel port, real time clock, 16K RAM/ROM board, and a prototyping board designed specifically for the Color Computer. For more information write or call for our catalog.

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```
Y?,12
2318 DATA WHO HAD THE FIRST BATH
TUB IN-   STALLED IN THE WHITE H
OUSE?,13,WHO HAD THE FIRST FURNA
CE IN-   STALLED IN THE WHITE HO
USE?,14
2320 DATA WHO WAS THE ONLY BACHE
LOR        PRESIDENT?,15,WHO WAS
THE FIRST PRESIDENT TO  HAVE HIS
 INAUGURATION PHOTO-    GRAPHED?
,15
2322 DATA WHO WAS THE FIRST PRES
IDENT BORNOUTSIDE THE BORDERS OF
 THE      ORIGINAL 13 COLONIES?,
16,WHO WAS THE ONLY PRESIDENT TO
   HAVE A PATENT ISSUED IN HIS
   NAME?,16,WHO WAS THE FIRST RE
PUBLICAN    PRESIDENT?,16
2324 DATA WHICH PRESIDENT NEVER
SPENT A   DAY IN SCHOOL?,17,WHIC
H PRESIDENT ESTABLISHED THE FIRS
T NATIONAL PARK?,18,WHO SMOKED T
WENTY CIGARS A DAY?,18
2326 DATA WHO HAD THE FIRST TELE
PHONE IN- STALLED IN THE WHITE H
OUSE?,19,WHO WAS THE FIRST PRESI
DENT TO  VISIT THE WEST COAST?,1
9
2328 DATA WHICH PRESIDENT COULD
WRITE WITHBOTH HANDS?,20,WHO WAS
 THE 2ND PRESIDENT TO BE ASSASIN
ATED?,20,WHO WAS THE FIRST PRESI
DENT TO  HAVE A VALET?,21
2330 DATA WHO WAS THE ONLY PRESI
DENT THAT SERVED TWO NON-CONSECU
TIVE TERMS?,22,WHICH PRESIDENT W
AS MARRIED IN  THE WHITE HOUSE?,
22,WHOSE DAUGHTER HAD A CANDY BA
R  (BABY RUTH) NAMED AFTER HER?,
22
2332 DATA WHICH PRESIDENT HAD EL
ECTRICITY INSTALLED IN THE WHITE
 HOUSE?,23,WHO WAS THE LAST CIVI
L WAR      VETERAN TO BECOME PRE
SIDENT?,25,WHO WAS PRESIDENT DUR
ING THE     SPANISH-AMERICAN WAR?
,25
2334 DATA WHO WAS THE YOUNGEST M
AN TO BE- COME PRESIDENT?,26,WHO
 ESTABLISHED THE FIRST WHITE HOU
SE PRESS ROOM?,26
2336 DATA WHO WAS THE HEAVIEST P
RESIDENT  (OVER 300 POUNDS)?,27,
WHICH PRESIDENT WAS THE FIRST TO
THROW OUT THE FIRST PITCH OF A
BASEBALL SEASON?,27,WHO WAS THE
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```
ONLY MAN TO BE PRES-IDENT AND CH
IEF JUSTICE OF THE  SUPREME COUR
T?,27
2338 DATA WHO WAS THE FIRST PRES
IDENT WITHA PH.D. DEGREE?,28,WHO
 BESIDES T. ROOSEVELT GOT A  NOB
EL PRIZE?,28
2340 DATA WHICH PRESIDENT WON TH
E FIRST   ELECTION IN WHICH WOME
N COULD   VOTE?,29,WHO FIRST USE
D A RADIO IN THE   WHITE HOUSE?,
29,WHO WAS PRESIDENT DURING THE
   TEAPOT DOME SCANDAL?,29
2342 DATA WHO WAS PRESIDENT WHEN
 J. EDGAR HOOVER WAS APPOINTED H
EAD OF THEFBI?,30,WHO WAS THE FI
RST PRESIDENT BORNWEST OF THE MI
SSISSIPPI RIVER?,31,WHO WAS PRES
IDENT WHEN THE STAR SPANGLED BAN
NER BECAME OUR       NATIONAL ANT
HEM?,31
2344 DATA WHICH PRESIDENT SERVED
 MORE THANTWO FULL TERMS?,32,WHO
 WAS THE FIRST PRESIDENT TO  APP
EAR ON TELEVISION?,32,WHO WAS TH
E FIRST PRESIDENT TO  FLY IN AN
AIRPLANE WHILE IN     OFFICE?,32
2346 DATA WHICH PRESIDENT APPOIN
TED THE   FIRST WOMAN CABINET ME
MBER?,32,WHO WAS PRESIDENT DURIN
G THE    ONLY NUCLEAR ATTACK IN
HISTORY?,33
2348 DATA WHO WAS THE FIRST PRES
IDENT TO  APPEAR ON COLOR TV?,34
,WHO WAS THE ONLY PRESIDENT TO
 SCORE A HOLE-IN-ONE WHILE PLAY-
 ING GOLF?,34
2350 DATA WHO WAS THE YOUNGEST M
AN TO BE  ELECTED PRESIDENT?,35,
WHO WAS THE FIRST ROMAN CATHOLIC
PRESIDENT?,35
2352 DATA WHO WAS THE 2ND TALLES
T         PRESIDENT?,36,WHO WAS
THE ONLY PRESIDENT TO   RESIGN F
ROM OFFICE?,37,WHO WAS THE FIRST
 PRESIDENT TO  VISIT ALL 50 STAT
ES?,37
2354 DATA WHICH PRESIDENT WAS NE
VER ELEC- TED TO THE OFFICE OF P
RESIDENT  OR VICE PRES. IN AN EL
ECTION?,38,WHO WAS THE ONLY MAN
FROM THE   DEEP SOUTH ELECTED PR
ESIDENT    AFTER THE CIVIL WAR?,
39
2355 DATA WHO WAS THE ONLY PRESI
DENT TO   BE IN A MOVIE WHICH ST
ARRED A   CHIMPANZEE?,40,WHO WAS
 THE OLDEST PRESIDENT     EVER EL
ECTED TO OFFICE?,40
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Software being used world-wide by ham operators.
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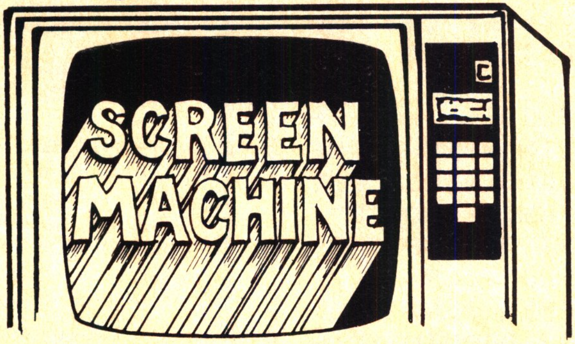
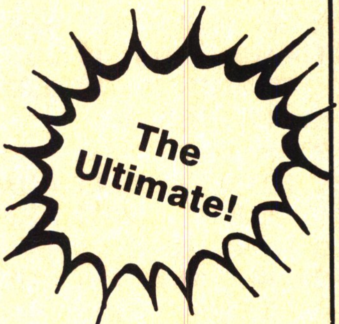
Sugar Software

Sugar Software




The Ultimate!

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RAINBOW SCREEN MACHINE

- **The Rolls Royce of graphics/text screen enhancers — more screen features than all others combined!**
- Add these features to your computer/program: ML extension of Basic loads on top of 16, 32, or 64K machines to enable easy mixture of **hi-res graphics and text** in your programs. Dense text or large lettering for children, visually impaired or VCR title screens with no programming!
- User definable 224 character set featuring lower case descenders, Greek, cars, tank, planes, etc., completely interfaced with **all keys, commands, and PMODES.** 12 sizes (most colored) from 16 x 8 to **64 x 24. PRINT @, TAB and comma fields are fully supported.**
- 2 distinct character sets automatically switch for sharpest lettering featuring **underline, subscript, superscript, reverse video, top and bottom scroll protect, double width, colored characters in PMODE 4, and help screen.**
- Simple 2-letter abbreviated commands inside your program or **control key** entry from keyboard, even during program execution!
- Includes demo program, **character generator** program and manual. 16K Ext. Basic required — 32K recommended. **$29.95 Tape; $32.95 Disk.**

Screen Machine can be used in games, word processors, utilities, etc. In addition, the custom graphics characters can be used to develop easy, effective hi-res character-graphics programs. The potential is truly unlimited.

Screen Machine can be used to directly create video recorder title screens or large lettering for children or the visually impaired simply by typing.

SUPER SCREEN MACHINE

- **Revolutionary — heralded as the most useful, powerful and versatile state-of-the-art utility ever developed for the Color Computer!**
- All of the features of Screen Machine and more:
- Variable **SMOOTH Scroll** for professional displays, listings, business use.
- Variable volume **KEY Click** (tactile feedback).
- **EDTASM+ command** for instant compatibility with cartridge EDTASM
- **Superpatch+ command** for instant compatibility with the Superpatch+ Editor-assembler
- True **Break key** disable and recognition.
- 10 User Definable commands used to activate your special drivers or subroutine.
- Dynamic **Screen Dump command** for use with Custom Software Engineering's Graphic Screen Print program for simple printer "Snapshots" of your screen even during program execution!
- **The new standard** — Upgradeable at any time from previous Rainbow-Writer or Screen Machine purchase. Return old program, manual, plus cost difference and $7.00 shipping and handling.
- Super Screen Machine **$44.95 Tape; $47.95 Disk.**

Screen Machine is fully interfaced with all keys and commands. Although some Basic programming knowledge is recommended just a few minutes spent studying and referencing your computer's Basic manuals will turn you on to the power of computing with Screen Machine.

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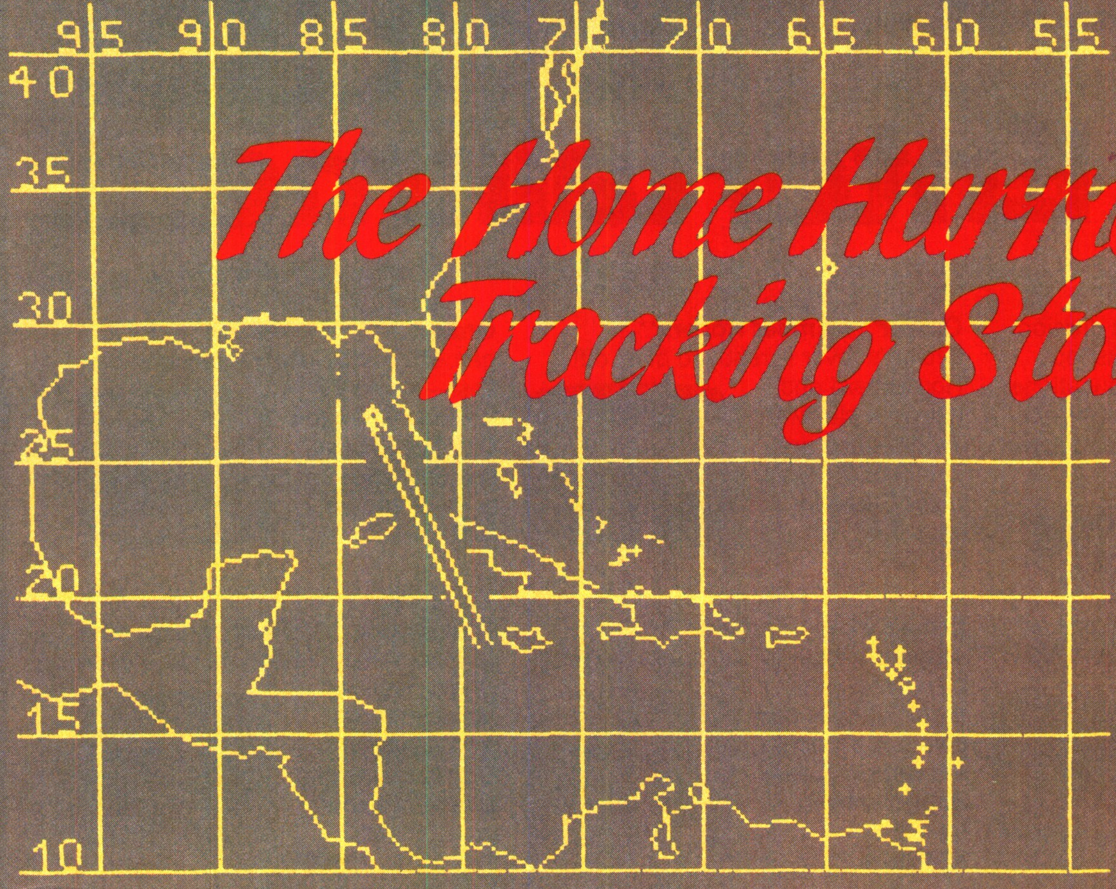
32K
ECB

The Home Hurricane Tracking Station



**By Ed Jones,
Gene Clifton
and
Wayne Davis**

If you've ever been concerned about the possible course of a hurricane, or just have an active curiosity about meteorological matters, the accompanying program is for you.

Now you can throw away those tracking charts you got at the supermarket the other day, your computer has just become an electronic tracking chart.

This program offers two options; projection and position plotting.

By entering the reported latitude and longitude of the hurricane, then inputting the direction of travel, the program will plot the projected course and display it graphically.

In option two, position plotting, it is possible to enter the reported positions (accumulated daily), so that an overall picture can be developed as to the path the hurricane has taken.

This program allows the plots to be saved to disk or tape. These plots can later be reloaded and additional plots can then be added. Just remember to rerecord the new plots on disk or tape.

For those with graphic printers desiring hard copy printouts, we suggest the use of the *GRAFDUMP* program as printed in the Oct. '83 issue of RAINBOW.

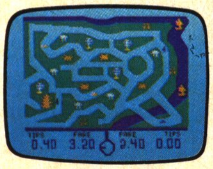
Attention Color Computer Owners!

Radio Shack Has and Entertainment

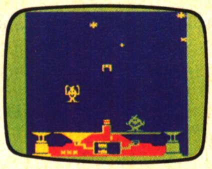
The CTW Software Group, a division of Children's Television Workshop, brings you ten game-style educational programs. Each one encourages children to experiment, explore and solve problems while having fun.

For TRS-80® Color Computers with Extended BASIC **19.95** Each

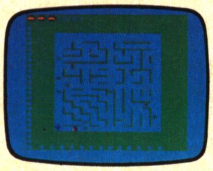
Taxi.*** Kids earn fares and tips as they drive through six cities from New York to Shanghai. A Cooperative Strategy Game for ages 7 and up. #26-2509.



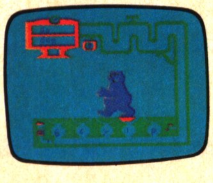
Peanut Butter Panic.*** The sky's the limit as players cooperate to catch stars, make sandwiches, and win. A Cooperative Strategy Game for ages 7 and up. #26-2523.



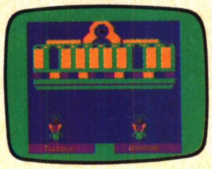
Star Trap.*** Players must race through a maze to trap a slippery star before time runs out! A Cooperative Strategy Game for ages 7 and up. #26-2510.



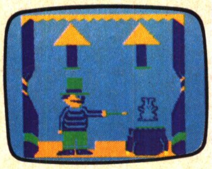
Cookie Monster's Letter Crunch.™*** It's Cookie Time! Help Cookie Monster match words and letters to bake and eat cookies! A Basic Skills Game for ages 3-6. #26-2526.



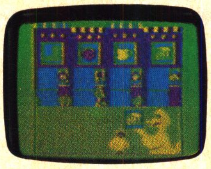
Grover's Number Rover.™** Grover's rover is ready to blast off! Hop aboard and help him play with Twiddlebugs and numbers! A Basic Skills Game for ages 3-6. #26-2522.



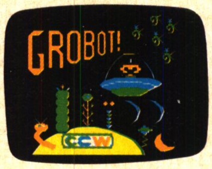
Ernie's Magic Shapes.™** Ernie wears the top hat, but you're the magician. Help Ernie match shapes and colors in six different ways. A Basic Skills Game for ages 3-6. #26-2524.



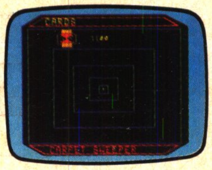
Big Bird's Special Delivery.™** Help Big Bird deliver the mail! Match the pictures and bring each package to the right store. A Basic Skills Game for ages 3-6. #26-2525.



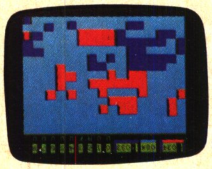
Grobot.*** How well will your astro-garden grow? Plant, protect and harvest—it's up to you and Grobot. A Creative Exploration Game for ages 10 and up. #26-2527.



Time Bound.*** Race through time and learn about history, in hot pursuit of your hapless assistant, Anacron. Creative Exploration Game for ages 10 and up. #26-2528.



Flip Side.*** Stake your claim, surround the squares, and watch the screen flip colors! Planning is the key. A Creative Exploration Game for ages 10 and up. #26-2529.



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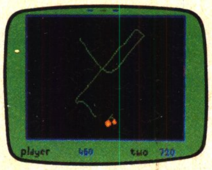
*Joysticks required. **Cassette recorder required.
***Joysticks and cassette recorder required.

the Educational Software You Want.

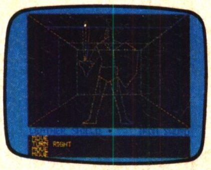
Why feed quarters into video game machines when you can bring arcade-style thrills into your own living room with Radio Shack's exciting Color Computer games. They can provide hours of fun for the whole family.

Low As 19^{95}

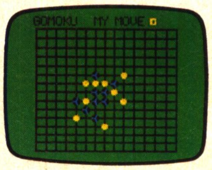
Double Back.* As you "double back" to catch your own tail, try to encircle the "safe" screen objects to gain points in this tricky game. Challenges mount as you play. #26-3091. **$19.95**



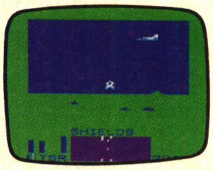
Dungeons of Daggorath.* You're pitted against a succession of awesome beasts. Each victory brings you closer to your ultimate opponent—the evil wizard! #26-3093. **$29.95**



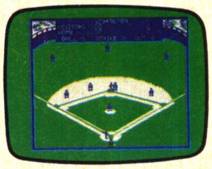
Gomoku and Renju. The classic oriental game of strategy! Block your opponent while attempting to place five of your own men in a row. Hours of fun. #26-3069. **$19.95**



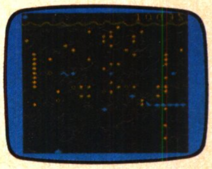
Star Blaze.* Protect the Milky Way! Radar shows menacing vessels nearby. Seek, destroy and check radar again. Red alert! There's no let up in the excitement. #26-3094. **$19.95**



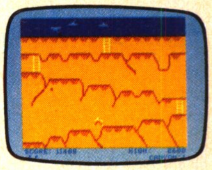
Baseball. Nine innings of fun! You're in full control of this realistic simulation of America's Number One sport, both behind the plate and on the field. #26-3095. **$24.95**



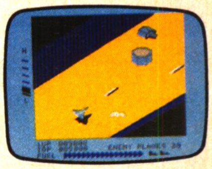
Slay the Nerius.* Defend your submarines against deadly starfish and the ancient seaworm—the fearsome Nerius, a creepy nemesis from the Deep. #26-3086. **$24.95**

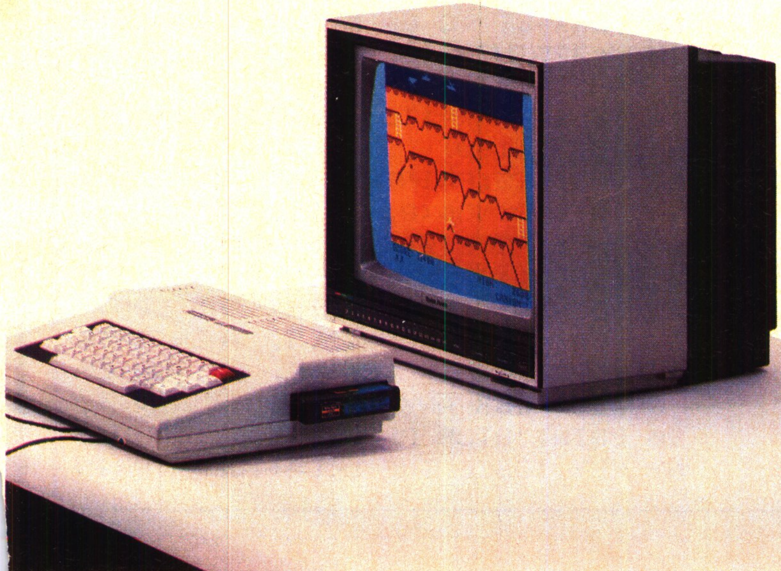


Canyon Climber.* An action game with a difference. As a cliff hanger, you're challenged by one test after another—kicking goats, zinging arrows and falling objects! #26-3089. **$34.95**



ZAXXON.*** The official home version of the great arcade favorite by Sega! Match wits with the deadly ZAXXON Robot! Challenges escalate as you progress. 32K required. #26-3062. **$34.95**





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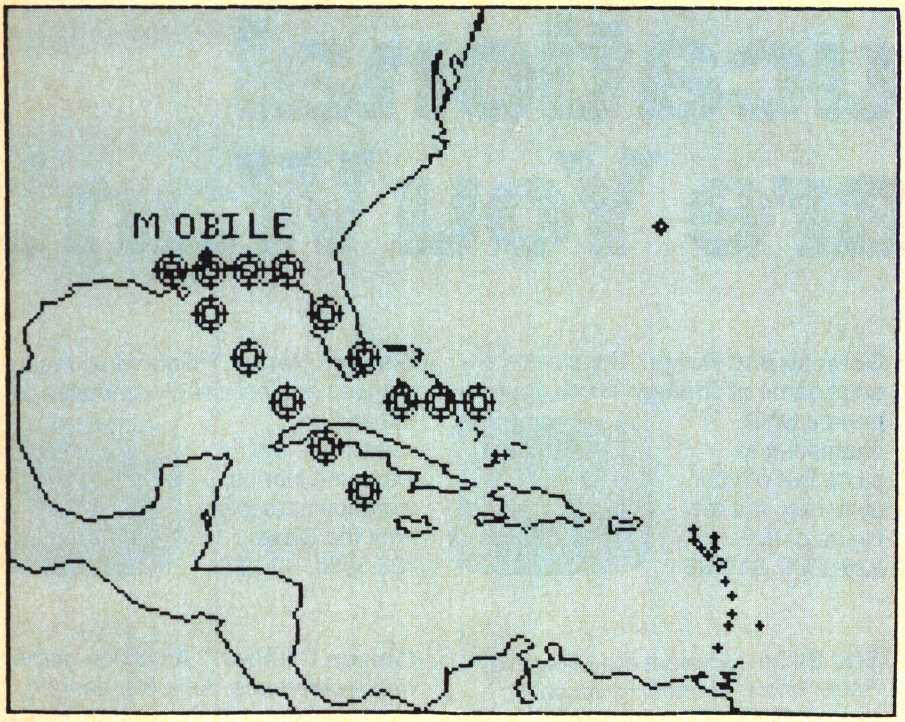

If this program is being typed by hand, Line 60 should be entered as shown, including spaces. Altering the spacing will affect the sound.

In Line 120, option three will reset your computer to a cold start. To prevent the cold start, change *POKE113,0: EXEC40999* to *END*.

As always, save the program to disk or tape before running.

The following wrote and developed the "HURICANE": Wayne Davis, a student at a technical school studying radio and TV repair; Gene Clifton, a communications specialist with the U.S. Coast Guard; and Ed Jones, a retired Federal Aviation Administration air traffic controller.

50	75	380	116
110	40	430	197
160	163	530	32
250	97	590	128
310	247	670	122
		END	115

The listing:

```
10 CLEAR1000:PMODE3,1:SCREEN1,1:
PCLS:DRAW"BM45,50C2U14BR8D14BL7B
U7R7BR6BU7D13F1R4E2U12BR7D14U14R
5F2D3G2L5F7BR7U14R5F2D3G2L5F7BR1
4L8R4U14L4R8BR15BD12G2L5H2U10E2R
5F2BR6BU1D13U12E2R3F2D12BL6BU4R4
BD4BR9U14D2F10BD2U14BD14BR5R6L6U
7R4BL4U7R6BD17L120"
20 DRAW"BM123,80U14L4R8BR6D14U14
R5F2D3G2L5F7BR9U12E2R3F2D12BL6BU
4R4BD4BR17BU2G2L4H2U10E2R4F2BR4D
12U14D8E8G7D1F6BR12L6U7R4L4U7R6B
R7D14U14R5F2D3G2L5F7BD3L90":DRAW
"BM30,140C3D6R1E2U1D1F2R1U6D6BR4
U6R3F1D1G1L2R1D1F2BR4R4L2U6L2R4B
R4R4L2D6"
30 DRAW"BM64,140R4L2D6BR10L4U3R3
L3U3R4BR4D6U6R1D1F4D1R1U6BR15BD6
U6BL1R3F1D1G1L1R1F1D1G1L3BR8BU6D
1F2D3U3E2U1BD6BR5BU1U1BU2U1":DRA
W"BM130,140C4D6R1E2U1D1F2R1U6D6B
R5U1BD1BR7U4E2R1F2D4BL3BU2R2BD2B
R5U1BD1BR11U6R2F2D2G2L2BR8U4E2R1
F2D4BL3BU2R2BD2"
40 DRAW"BM184,140D4F2E2U4BR4R4L2
D6L2R4BR4R4U3L4U3R4BD14BL69H1L2G
2D3F1R3E1BD1BR3U1D1BR14L4U3R3L3U
3R4BD6BR4U1BD1BR17BU5H1L2G2D3F1R
3E1BD1BR4BU6D6R4BR4R4L2U6L2R4BR8
L4D3R3L3D3BR9U6L2R4BR8L4D6R4U6BR
5D6U6R1D1F4D1R1U6D6BR3"
50 DRAW"BM135,173C4L4U6R4BD3BL2L
1BD3BR6U1BD1BR10U6D6R1E2U1D1F2R1
U6D6BR4U1BD1BR10U3D3R4U6BR4D6R4U
6L4BR8D6U6R2D1F4D1U6BR4R4L4D3R3L
3D3R4BR4R4U3L4U3R4":FORX=1TO200:
PMODE3:SCREEN1,0:PMODE4:SCREEN1,
1:NEXT:CLS0:BX=1.8:SO=65312:POKE
65315,63:ST=8:EN=240
60 FORX=ST TO EN STEPBX:UU=UU+1:
IFUU=325THEN70ELSEPOKESO,X:POKES
O,EN-X:NEXT:GOTO60
70 PCLS:FORX=1TO500:NEXT:V=1:DIM
H(100),I(100)
80 V=1:CLS:PRINTSTRING$(32,252);
:PRINTSTRING$(8,128);"path proje
ction";:POKE1068,128:PRINTSTRING
$(9,128);:PRINT"ENTER THE STARTI
NG POINT IN LAT":PRINT"AND LON.
EX: LAT=15.3 LON=75.3. THEN ENTE
R DIRECTION OF TRAVEL. EX: NW OR
 NWW. PRESS ANY KEY TO"
90 PRINT"STOP PROJECTION, THEN A
NY KEY TOSEE THE LOCATION.":PRIN
```

```
TSTRING$(32,252);:PRINTSTRING$(7
,128);"location plotting";:POKE1
327,128:PRINTSTRING$(8,128);:PRI
NT"INDIVIDUAL PLOT LOCATIONS MAY
 BELOADED FROM TAPE OR DISK, OR
MAYBE ENTER AND THEN SAVED."
100 PRINTSTRING$(32,252);:PRINTS
TRING$(9,128);"select 1 or 2 ";:
PRINTSTRING$(11,128);"press 3 to
 end this program";:POKE1516,128
:POKE1520,128:POKE1525,128:POKE1
533,128:POKE1534,128:POKE1535,12
8:POKE1511,128:POKE1512,51:POKE1
513,128:POKE1494,128
110 POKE1493,50:POKE1492,128:POK
E1489,128:POKE1488,49:POKE1487,1
28:SCREEN0,1
120 QQ$=INKEY$:IFQQ$=""THEN120EL
SESOUND180,1:SOUND220,1:IFQQ$<"1
"ORQQ$>"3"THEN120ELSEIFQQ$="2"TH
EN190ELSEIFQQ$="3"THENPOKE113,0:
EXEC40999
130 CLS7:J=1:PRINT@96,STRING$(32
,236);" ENTER LATITUDE (FROM 11
TO 39)":PRINTSTRING$(32,143);:PR
INT@192,STRING$(32,227);:PRINT@1
74,"";:INPUTA:SOUND180,1:SOUND22
0,1:IFA<11ORA>39THEN130
140 PRINT@224,STRING$(32,236);"
ENTER LONGITUDE (FROM 54 TO 95)"
;:PRINTSTRING$(32,143);:PRINTSTR
ING$(32,227);:PRINT@302,"";:INPU
TC:SOUND180,1:SOUND220,1:IFC<54O
RC>95THEN140
150 PRINT@352,STRING$(32,236);"
WHAT IS THE DIRECTION.EX: WNW.":
PRINTSTRING$(32,143);:PRINT@448,
STRING$(32,227);:PRINT@430,"";:I
NPUTB$:SOUND180,1:SOUND220,1:B=(
(42-A)*5.96875):D=((98.5-C)*5.54
37826)
160 IFB$="N"THENX=0:Y=-1:ELSEIFB
$="S"THENX=0:Y=1:ELSEIFB$="W"THE
NX=-1:Y=0:ELSEIFB$="E"THENX=1:Y=
0:ELSEIFB$="NE"THENX=1:Y=-1:ELSE
IFB$="NW"THENX=-1:Y=-1:ELSEIFB$=
"SE"THENX=1:Y=1:ELSEIFB$="SW"THE
NX=-1:Y=1
170 IFB$="ENE"THENX=2:Y=-1:ELSEI
FB$="ESE"THENX=2:Y=1:ELSEIFB$="W
NW"THENX=-2:Y=-1:ELSEIFB$="WSW"T
HENX=-2:Y=1:ELSEIFB$="NNW"THENX=
-1:Y=-2:ELSEIFB$="NNE"THENX=1:Y=
-2:ELSEIFB$="SSW"THENX=-1:Y=2:EL
SEIFB$="SSE"THENX=1:Y=2
180 GOTO270
190 SOUND5,1:CLS8:PRINT@32,STRIN
G$(32,147);" ARE YOU ENTERING NE
W PLOT DATA  OR DO YOU WISH TO A
DD PLOTS TO  OLD RECORDS <ENTER
nEW OR oLD>":PRINTSTRING$(32,156
);
200 NO$=INKEY$:IFNO$=""THEN200EL
SEIFNO$<>"N"ANDNO$<>"O"THEN200EL
SEIFNO$="O"THEN680
210 CLS:IFV>1THENV=V+1
220 PRINT"   PRESS <ENTER> WHEN
FINSHED":PRINTSTRING$(32,34);:SO
UND180,1:SOUND220,1:TA=48
230 TA=TA+16:IFTA>448THENTA=448
240 PRINT@TA+1,V;". ";:INPUT"LAT
";H(V):IFH(V)=0THEN270ELSEIFH(V)
<11ORH(V)>41THENPRINT@TA,"    ":G
OTO240
250 TA=TA+16:IFTA>458THENTA=464
260 PRINT@TA+3,"LON";:INPUTI(V):
IFI(V)<54ORI(V)>98THENPRINT@TA,"
   ":GOTO260:ELSEV=V+1:GOTO230
270 PRINT@0,"    do you want gri
d overlay?":PRINTSTRING$(32,236)
;:SOUND5,5:PRINT@0,"     DO YOU W
ANT GRID OVERLAY?":SOUND50,5:R$=
INKEY$:IFR$="N"THEN330ELSEIFR$="
Y"THEN280ELSEIFR$<>"N"ORR$<>"Y"O
RR$=""THEN270
280 PMODE4,1:SCREEN1,1:COLOR0,1:
PCLS:LN=18:FORLL=1TO9:LINE(LN,0)
-(LN,192),PSET:LN=LN+28:NEXTLL:L
N=11:FORLL=1TO7:LINE(0,LN)-(256,
LN),PSET:LN=LN+30:NEXTLL
290 DRAW"BM11,10R3E1U4H1L2G1D1F1
R2BD3BR7R3E1U1H1L3U3R4BD6BR14R3E
1U4H1L2G1D1F1R2BR10BD3E1U4H1L2G1
D4F1R2BR16H1U1E1R2E1U1H1L2G1D1F1
R2F1D1G1L2BR9R3E1U1H1L3U3R4BD6BR
15H1U1E1R2E1U1H1L2G1D1F1R2F1D1G1
L2BR12E1U4H1L2G1D4F1R2BR15"
300 DRAW "BM123,10E4U2L5BR11BD6R
3E1U1H1L3U3R4BD6BR14E4U2L5BD6BR1
4E1U4H1L2G1D4F1R2BR16R2E1U1H1L2G
1D1F1H1U4E1R2BR7BD6R3E1U1H1L3U3R
4BD6BR15R2E1U1H1L2G1D1F1H1U4E1R2
BR10BD6E1U4H1L2G1D4F1R2BR15R3E1U
1H1L3U3R4BD6BR6R3E1U1H1L3U3R4"
310 DRAW"BM3,20U6L1G2D1R5BD3BR7E
1U4H1L2G1D4F1R2BD20BL10R2E1U1H1E
1U1H1L2G1BD5BR7R3E1U1H1L3U3R4BD3
6BL11R3E1U1H1E1U1H1L2G1BR10BD5E1
U4H1L2G1D4F1R2BD30BL6L4U1E3R1U1H
1L2G1BR7BD5R3E1U1H1L3U3R4"
320 DRAW "BM6,130L4U1E3R1UBH1L2G
1BR11BD4U4H1L2G1D4F1R2BD30BL8U6G
2BD4BR7R3E1U1H1L3U3R4BD36BL8U6G2
BD4BR9E1U4H1L2G1D4F1R2":GOTO340
330 PMODE4,1:SCREEN1,1:COLOR0,1:
PCLS:DRAW"BM0,0R255D191L255U191"
```

```
340 DRAW"BM37,62U6R1F2D1U1E2R1D6
BR9E1U4H1L2G1D4F1R2BR5U6L1R3F1D1
G1L1R1F1D1G1L3BR10L4R2U6L2R4BR4D
6R4BR7L4U6R4BD3BL2L1"
350 LINE(136,3)-(135,6),PSET:FOR
LN=1TO180:READLA,LB:LINE-(LA,LB)
,PSET:NEXT:GOTO420
360 DATA136,0,130,16,128,13,127,
15,129,20,124,28,126,22,123,18,1
24,12,122,16,122,28,125,34,122,3
5,126,36,124,40,121,40,121,42,11
4,47,113,48,110,49,100,57,95,64,
94,67,95,71,96,75,100,84,100,87,
101,88,102,92,101,97,100,100,98,
101,96,100,95,97,92,96,91,93
370 DATA90,90,87,88,89,85,88,84,
87,85,87,78,84,76,82,73,80,72,77
,73,74,75,72,74,69,71,64,70,62,7
1,58,71,58,67,57,70,48,71,45,71,
48,73,51,72,49,75,52,77,50,79,48
,76,44,78,36,74,34,75,28,74,22,7
5,20,75,18,76,19,77,14,80,10,80,
10,82,5,87,5,91,7,94,6,98
380 DATA3,99,3,118,8,128,12,134,
17,137,19,137,22,139,24,139,28,1
38,34,137,39,137,40,135,42,135,4
4,128,44,126,45,124,50,123,53,12
2,58,121,60,122,63,121,64,124,61
,128,58,140,57,136,56,137,57,140
,58,144,56,148,53,152,71,152,77,
153,82,156,84,156,84,162
390 DATA82,164,83,168,83,171,81,
177,84,181,86,184,91,188,94,189,
101,188,104,185,106,186,108,185,
110,187,112,187,119,191,126,185,
126,179,127,180,130,178,133,178,
134,176,139,176,143,175,144,172,
148,170,150,171,151,173,147,175,
149,177,149,180,146,184
400 DATA148,188,151,188,152,187,
150,184,150,180,151,178,157,176,
155,174,156,172,158,172,159,174,
159,176,164,176,169,181,179,180,
185,184,200,180,201,181,197,182,
201,185,208,187,208,190,214,191,
82,192,80,186,71,184,60,168,62,1
66,55,164,52,166,38,162
410 DATA22,150,18,150,12,152,8,1
53,4,151,0,149
420 LINE(75,119)-(78,120),PSET:F
ORLN=1TO28:READMA,MB:LINE-(MA,MB
),PSET:NEXT:GOTO440
430 DATA81,118,84,118,87,115,92,
115,90,117,95,119,96,118,100,118
,101,121,109,121,109,124,113,126
,118,126,115,131,119,130,128,131
,134,129,125,126,126,124,121,123
,119,121,99,113,94,113,90,112,83
,113,78,116,78,118,75,119
440 LINE(123,141)-(117,143),PSET
:FORLN=1TO9:READNA,NB:LINE-(NA,N
B),PSET:NEXT:GOTO460
450 DATA114,142,114,141,112,141,
111,139,114,138,118,139,120,138,
120,140,123,141
460 LINE(164,140)-(160,138),PSET
:FORLN=1TO21:READOA,OB:LINE-(OA,
OB),PSET:NEXT:GOTO480
470 DATA155,139,153,139,149,142,
147,140,138,139,135,140,134,138,
135,137,144,138,142,136,142,133,
138,132,143,129,148,131,153,130,
156,132,160,132,161,135,166,137,
167,139,164,140
480 LINE(180,141)-(176,141),PSET
:FORLN=1TO7:READQA,QB:LINE-(QA,Q
B),PSET:NEXT:GOTO500
490 DATA173,142,173,139,174,138,
178,139,181,138,182,139,180,141
500 LINE(115,109)-(114,106),PSET
:FORLN=1TO7:READRA,RB:LINE-(RA,R
B),PSET:NEXT:GOTO520
510 DATA111,104,112,101,114,102,
115,104,115,106,116,108,115,109
520 LINE(108,92)-(114,92),PSET:L
INE-(114,93),PSET:LINE-(109,93),
PSET:LINE-(108,92),PSET:LINE(116
,92)-(119,94),PSET:LINE-(117,97)
,PSET:LINE-(116,96),PSET:LINE-(1
18,94),PSET:LINE-(116,92),PSET:L
INE(120,99)-(123,101),PSET:LINE-
(123,103),PSET
530 LINE(126,104)-(128,107),PSET
:LINE(128,110)-(130,113),PSET:LI
NE(134,114)-(136,115),PSET:LINE-
(134,117),PSET:LINE(145,118)-(14
7,118),PSET:LINE-(149,119),PSET:
LINE(137,124)-(141,123),PSET:LIN
E-(139,124),PSET:LINE-(137,124),
PSET
540 LINE(205,149)-(206,151),PSET
:LINE-(205,151),PSET:LINE-(204,1
52),PSET:LINE-(203,150),PSET:LIN
E-(205,149),PSET:LINE(209,178)-(
211,177),PSET
550 LINE(209,180)-(205,180),PSET
:FORLN=1TO7:READSA,SB:LINE-(SA,S
B),PSET:NEXT:GOTO570
560 DATA209,182,204,183,205,184,
207,184,208,185,207,182,208,180
570 FORLN=1TO14:READCR,CS:CIRCLE
(CR,CS),1:NEXT:CIRCLE(187,59),2:
CIRCLE(57,67),2:GOTO590
580 DATA143,121,140,121,197,141,
197,144,199,146,203,143,203,146,
201,148,206,155,208,159,208,164,
207,167,216,167,204,173
590 RESTORE:IFQQ$="1"THENCIRCLE(
D,B),6:SOUND5,1:CIRCLE(D,B),3:CI
RCLE(D,B),6,5:CIRCLE(D,B),3,5:CI
RCLE(D-(5*X),B-(5*Y)),2:CIRCLE(D
-(7*X),B-(7*Y)),1,5:D=D+X:B=B+Y:
A$=INKEY$:IFA$>""THEN630ELSEIFIN
T(D)<2ORINT(D)>254ORINT(B)<2ORIN
T(B)>190THEN630ELSE590
600 P=1:IFH(P)=0THEN630
610 IFQQ$="2"THENA=H(P):C=I(P):B
=((42-A)*5.96875):D=((98.5-C)*5.
5437826):SOUND5,1:FORPP=1TO4:CIR
CLE(D,B),3,8:CIRCLE(D,B),5,8:CIR
CLE(D,B),3,5:CIRCLE(D,B),5,5:NEX
TPP:CIRCLE(D,B),3,8:CIRCLE(D,B),
5,8
620 P=P+1:IFH(P)>0THEN610
630 A$=INKEY$:IFA$=""THEN630ELSE
CLS:SOUND180,1:SOUND220,1:PRINT"
   THE HURRICANE LOCATION IS":PR
INTSTRING$(32,156);:F=((B/5.9687
5)-42)*-1:G=((D/5.5437826)-98.5)
*-1:FORX=1TO500:NEXT:PRINT:IFA=0
THENF=0:IFC=0THENG=0
640 PRINTSTRING$(32,34);"      LA
TITUDE=";:PRINTF:PRINTSTRING$(32
,34);:SOUND50,1:FORX=1TO500:NEXT
:FORX=1TO500:NEXT:PRINT"      LON
GITUDE =";:PRINTG:SOUND50,1:PRIN
TSTRING$(32,34);:FORX=1TO500:NEX
T
650 IFQQ$="1"THENA$=INKEY$:PRINT
@389,"press any key for menu":IF
A$=""THEN650ELSE80
660 FORX=1TO200:NEXT:SOUND50,1:I
FQQ$="2"THENPRINT@256," DO YOU W
ISH TO SAVE THE PLOTS?
  <yES OR nO>":PRINTSTRING$(32,3
4);:A$=INKEY$:IFA$=""THEN660ELSE
IFA$<>"Y"ANDA$<>"N"THEN660ELSEIF
A$="N"THENV=1:GOTO80
670 IFV>1THENNO$="N"
680 IFNO$="O"THENPRINT@224,STRIN
G$(32,147);"         <tAPE OR  dI
SK?>":PRINTSTRING$(32,156);:TD$=
INKEY$:IFTD$=""THEN680ELSEIFTD$<
>"D"ANDTD$<>"T"THEN680
690 IFNO$="N"THENPRINT@356,"
  <tAPE OR dISK>":PRINTSTRING$(3
2,34);:TD$=INKEY$:IFTD$=""THEN69
0ELSEIFTD$<>"D"ANDTD$<>"T"THEN69
0
700 IFNO$="O"THENPRINT@352,STRIN
G$(32,147);:PRINTSTRING$(32,143)
;:PRINTSTRING$(32,156);:SOUND50,
1:PRINT@392,"FILENAME:";:LINEINP
UTFZ$:SOUND50,1
710 IFNO$="N"THENPRINT@448,STRIN
G$(32,34);:SOUND50,1:PRINT@424,"
FILENAME:";:LINEINPUTFZ$:SOUND50
,1
720 IFTD$="T"THENTD=-1ELSEIFTD$=
"D"THENTD=1
730 IFNO$="N"THEN760ELSECLS7:PRI
NT@192,STRING$(32,147);:PRINT"
     LOADING '";:PRINTFZ$;:PRIN
T"'":PRINTSTRING$(32,156);:OPEN"
I",#TD,FZ$+"/DAT":X=1
740 IFEOF(TD)THEN750ELSEINPUT#TD
,H(X),I(X):X=X+1:GOTO740
750 CLOSE:V=X-1:CLS8:PRINT" THES
E '";:PRINTFZ$;:PRINT"' PLOTS LO
ADED":PRINTSTRING$(32,147);:FORQ
X=1TOV:PRINT" ";:PRINTQX;:PRINT"
LAT -";:PRINTH(QX);:PRINT"
LONG -";:PRINTI(QX):FORQZ=1TO40:
NEXTQZ:SOUND220,1:NEXTQX:FORQV=1
TO1000:NEXT:GOTO210
760 V=V-1:CLS8:PRINT@192,STRING$
(32,147);:PRINT" SAVING '";:PRIN
TFZ$;:PRINT"' --";:PRINTV;:PRINT
"PLOTS":PRINTSTRING$(32,156);:OP
EN"O",#TD,FZ$:FORX=1TOV:PRINT#TD
,H(X),I(X):NEXT:CLOSE#TD:GOTO80
```

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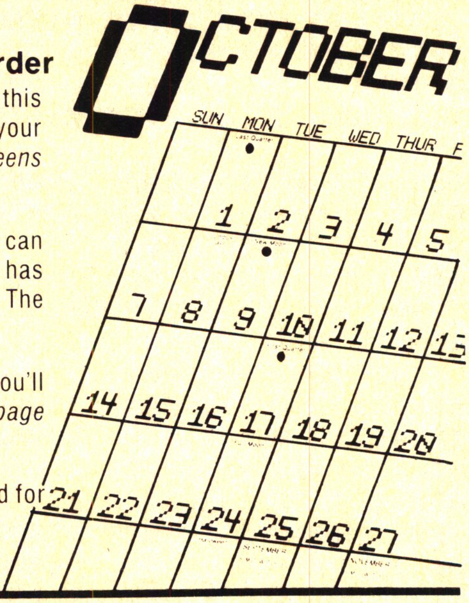
Don't Forget!

2. The Personal Time Management System & Event Recorder



You *won't forget* with **Don't Forget!** You'll actually enjoy getting organized with this personal time management system. The *Macintosh-like icons* make entering your personal schedule simple and fun. But if you need instructions, there are *help screens* to assist you.

You'll never miss a birthday or important appointment again! With **Don't Forget!** you can record the *entire year's* occasions and daily appointments ahead. Each day has spaces for *4 Special Occasions, 2 Memos,* and *hourly notes* for 6 am through 9 pm. The built-in 51 x 24 upper and lower case *hi-res display* makes it very easy to read.

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So use your CoCo's memory and **Don't Forget!** as your personal secretary. Designed for mouse, joystick, or keyboard entry, **Don't Forget** requires 32K and one disk drive.

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OBJECT: Solve the mystery at TRIDENT in as few moves as possible.

SETTING: In the beginning of the 21st century undersea cities, interstellar spaceships, colonies in other planets & solar systems, worker droids, super computers, are all realities. One hero of the time is MAJOR ISTAR. In the late 1990's when space exploration & colonies began, it was necessary to form a task force to offer help to all that needed it in these hostile environments. You, Camerion J. Istar, are a highly rated member of that team and you have never failed to solve a mystery!

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STAR TRADER

As a merchant ship captain in the far future you travel in real-time between solar systems, trading cargo, encountering pirate ships, stopping at starports for fuel or repairs, & making money! Your goal is to earn 1,000 credits to retire in luxury!

Your graphic cockpit shows readouts of your location, damage status, credit balance, cargo destination & due date, the location of nearby starships, fuel & laser power levels, & the current date. With your joystick you choose your next move or transaction. As you travel, transport, trade, & battle, you develop a reputation which effects your future activities & rewards.

With different skill levels & many variable factors, this simulation offers excitement & the challenge of a new game every time you play! (Requires 32K on cassette or 64K on disk, with one joystick or mouse, & Ext. Basic.)

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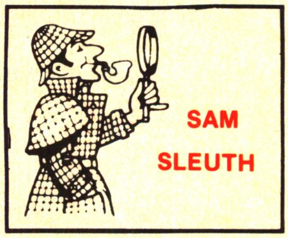

As a detective for Sam Sleuth Investigations you are given 3 cases (of increasing difficulty):

Case of the Missing Cat
Mystery at the Museum
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Using your sleuth skills (& joystick or mouse) you search the town (displayed in hi-res graphics), interviewing townspeople, collecting evidence, examining the grounds, & gathering data to solve the mysteries & apprehend the culprits. Remember you are working against the clock!

Investigate the bank, museum, school, offices & homes, market, gas station,... Talk to Mike, Willy, Roy, Sue, Chrissy,... And keep track of those addresses & clues!

The unique graphics presentation & mouse/joystick control are as intriguing as the mysteries! (Req. 64K & mouse or joystick).

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MIDDLE
Kingdom

MIDDLE KINGDOM

In this real time graphic adventure your goal is to become ruler of the Middle Kingdom, which can be achieved only by returning the three magic Rings to the Sanctuary. You must search the rooms of the Catacombs, Temple, & Pyramid.

You choose your character of a Magician, Merchant, or Warrior, each having their own weapons & abilities. You will face monsters of all types, Lizardmen, Trolls, Goblins, & worse. You'll find treasures of all kinds too as well as new weapons along the way!

Try this medieval adventure if you dare! (Requires 32K)

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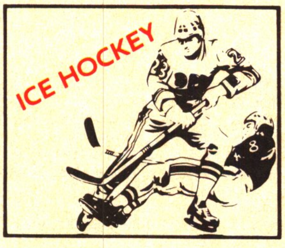
Or get involved with SPORTS!



Begin with our national anthem, then race into action in hi-res graphics with realistic player & puck movement. One or two players compete against the real time clock. Many skill levels for all ages. (Req. 32K)

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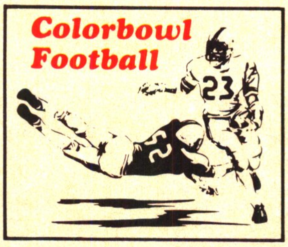

Big league graphics start the football season! Two players play against each other or one can sharpen his offense against the computer. Use 8 defensive plays, 9 offensive plays, & many formations to win the Colorbowl! (Req. 32K)

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18,290 Bill Sain, Charlotte, NC

ANNIHILATOR *(Chromasette)*
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ASSAULT *(MichTron)*
5,980 ★Kevin Marsh, Bokeelia, FL

ASTEROID
4014 ★Bobby Rosingana, Danville, CA

BAG-IT-MAN *(Aardvark)*
418,790 ★Cornelius Caesar, Hofheim, West Germany
101,400 Daniel Belisle, Montreal, Quebec
37,110 Stephane Asselin, Hauterive, Quebec,

BASEBALL *(Radio Shack)*
460-0 ★Walter Trainlips, Janesville, WI
324-0 Michael Rosenberg, Prestonsburg, KY
284-0 Seth Louis Newman, Yardley, PA
223-0 Chris Young, Ft. Worth, TX
188-0 Andrew Smith, Grimsby, Ontario,
159-0 Jack Darrah, Philadelphia, PA
114-0 Brennan Baybeck, Traverse City, MI
99-0 Walker Astle, Grimsby, Ontario
62-0 Eric Poulin, Montreal, Quebec,
56-0 Charles Yonts, Miami, FL
48-0 Brendan Smith, Coral Springs, FL

BATS AND BUGS *(*THE RAINBOW*)*
24,600 ★Michael Rosenberg, Prestonburg, KY
3,600 Apollo Latham, Rich Square, NC
2,750 ●Anthony Schmuck, Wellsville, PA

BEAM RIDER *(Spectral Associates)*
248,150 ★Robert Paul, Boynton Beach, FL

BIRD ATTACK *(Tom Mix)*
222,625 ★Andrew Smith, Grimsby, Ontario, Canada

BLACKJACK *(Radio Shack)*
39,450 ★Michael Rosenberg, Prestonsburg, KY
11,820 Woody Farmer, Acme, Alberta

BLACK SANCTUM *(Mark Data)*
132 ★Jeff Allen, Montrose, CO

BLOC HEAD *(Computerware)*
1,218,325 ★Brian Spek, Keswick, Ontario
1,006,200 Lindi Wolf, Fairbanks, AK
819,425 Keith Denhoed, Coalhurst, Alberta
781,350 Joe Golkosky, Portage, MI
395,175 Jeff Roberg, Winfield, KS

BUSTOUT *(Radio Shack)*
42,000 ★Derrick Kardos, Colonia, NJ
42,000 ★Martin Klein, Skokie, IL
34,700 Sara Hennessey, Golden Valley, MN
28,720 Perry Denton, New Baden, IL
27,880 Mike Wells, Pittsburgh, PA
19,630 Tommy Parker, Talladega, AL
9,178 Tony Boring, Armagh, PA

BUZZARD BAIT *(Tom Mix)*
6,447,950 ★Jon Griffith
5,488,250 Jim Kennett
2,902,700 Michael Popovich, Nashua, NH
2,087,650 Edmund Greene, Nashua, NH
1,134,600 Richard Buttermore, Grand Rapids, MI
1,125,600 Blossom Mayor, East Greenbush, NY
1,000,000 Donald Hummer, Reynoldsburg, OH
943,950 Theodore Mayor, East Greenbush, NY
848,900 Jon Carmichael, Ogden, UT
253,000 Phill Zarfos, Dallastown, PA
232,350 Marc Harris, Colorado Springs, CO

CALIXTO ISLAND *(Mark Data)*
136 ★David Voerman, Qualicum Beach, British Columbia

CANDY CO. *(Intracolor)*
451,382 ★Randall Edwards, Dunlap, KS
99,516 Tiffany Morgan, Lookout Mtn., TN

CANYON CLIMBER *(Radio Shack)*
8,990,000 ★Glen Giacomelli, Woodbridge, Ontario
1,603,400 Shen Mansell, Calgary, Alberta
1,571,300 Jeff Weaver, Gordonville, PA
1,426,600 Sean Whitley, Arvada, CO
1,400,200 James Stevenson, Marshall, TX
760,000 Mike Butenhoff, Minnesota City, MN

CASHMAN *(MichTron)*
$23,320 ★Jeff Allen, Montrose, CO
$22,310 Pete Olah, Garfield Hts., OH
$19,650 Perry Denton, New Baden, IL
$16,000 Scott Oberholtzer, Lexington, MA
$14,250 Paul Tisdel, Les Saules, Quebec

CAVERN COPTER *(*THE RAINBOW*)*
1213 ★Doug Schwartz, Glendale, AZ
747 ●Susan Ballinger, Uxbridge, Ontario

CHAMELEON *(Computerware)*
29,200 ★Baiju Shah, Deep River, Ontario

CHOPPER STRIKE *(MichTron)*
72,100 ★Lisa Siclari, Staten Island, NY
67,900 Matt McCann, Louisville, KY
63,000 Andrew Figel, Sardis, OH
47,400 David Figel, Sardis, OH
20,600 Mario Asselin, Hauterive, Quebec

CLOWNS & BALLOONS *(Radio Shack)*
128,210 ★Moe Tindell, Sebring, FL
116,475 Jeffrey Kochs, Grove City, OH
116,470 ●Colin Kerridge, Ladysmith, British Columbia
110,475 ●Andrew Truesdale, Ferguson, MO
104,270 Ken Bird, Delaware, OH
102,900 Cheryl Pratt, Moab, UT

COCO TREK *(Chromasette)*
2,500,000 ★Ted Warren, Morgan, ID

COLORPEDE *(Intracolor)*
10,001,051 ★Mark Smith, Santa Ana, CA
3,355,248 Scott Drake, Pine City, NY
2,614,230 Jerry Petkash, Warren, MI
2,547,299 Rich McGervey, Morgantown, WV
2,471,342 Vincent Lok, Ontario, Canada

COSMIC CLONES *(Mark Data)*
29,450 ★Robert Shaw, Kincardine, Ontario
6,050 ●Stephane Asselin, Hauterive, Quebec

COSMIC INVADERS *(Dragon Data, Ltd.)*
41,300 ★Walker Astle, Grimsby, Ontario
20,450 Andrew Smith, Grimsby, Ontario

CU*BER *(Tom Mix)*
204,575 ★Martin C. Klein, Skokie, IL
201,190 Jay Pribbie, Davenport, IA
196,090 Randall F. Edwards, Dunlap, KS
94,940 Martin C. Klein, Skokie, IL
49,510 Doug Kleir, Grand Rapids, MI
36,960 Blossom Mayor, East Greenbush, NY

DANGER RANGER *(Med Systems Software)*
1,962 ★Michael Rosenberg, Prestonsburg, KY
1,890 Fred Thompson, Saugus, MA

DEFENSE *(Spectral Associates)*
115,335 ★Patricia Bostedor, Jackson, MI
103,660 Mary A. Brickles, Allen Park, MI

DEMON SEED *(MichTron)*
13,010 ★Mario Asselin, Hauterive, Quebec

DESERT GOLF *(Spectral Associates)*
28 ★Craig Vodnik, Bensenville, IL
31 Kenton Fifield, Fort Francis, Ontario

DESERT PATROL
310,100 ★Stephane Asselin, Hauterive, Quebec

DEVIL ASSAULT *(Tom Mix)*
1,762,980 ★Michael Rosenberg, Prestonsburg, KY
1,294,300 John Statham, Strathroy, Ontario
625,000 Simon Dickson, Bangor, N. Ireland
318,550 Kanti Dinda, Kingston, Ontario
294,300 Chip Lilley, Finleyville, PA

DOODLE BUG *(Computerware)*
4,442,360 ★Eiko Cary, National City, CA
2,577,515 Tim Brown, Clio, MI
1,767,630 Perry Denton, New Baden, IL
448,890 Ellen Ballinger, Uxbridge, Ontario
109,660 Byron Albertson, Williams Lake, British Columbia

DOUBLE BACK *(Radio Shack)*
1,125,000 ★Mark Hurst, Sheridan, OR
1,080,000 Phillipe Duplanties, St. Jerome, Quebec
639,210 Paul Baker, Pittsburgh, PA
605,890 Peter Sherburne, Highland, CA
474,040 Paul Moritz, Butte, MT

DRACONIAN *(Tom Mix)*
190,840 ★Kyle Keller, Overland Park, KS
86,600 ●James Toth, Punxsutawney, PA
71,930 Michael Corman, W. Lafayette, IN
47,670 Dan Neuman, Wauwatosa, WI

DUNKEY MUNKEY *(Intellectronics)*
1,244,400 ★Jack Baran, Bensalem, PA
1,015,000 Kyle Keller, Overland Park, KS

ELECTRON *(Tom Mix)*
45,510 ★John Sandberg, Concord, CA
41,750 Michael Rosenberg, Prestonsburg, KY
22,990 Alan Morris, Chicopee, MA
19,500 Robby Presson, Florissant, MO
11,020 Alfredo Santos, New York, NY

FIRE COPTER *(Adventure International)*
97,390 ★Sam Hughes, Colton, CA
78,860 Woody Farmer, Acme, Alberta
53,280 Kevin Marsh, Bokeelia, FL

FLYBY *(Chromasette)*
104,980 ★David Finberg, Annandale, VA
28,910 Ron Suedersky, Universal City, TX
20,110 Rick Mansell, Calgary, Alberta
16,670 Michael Rhattigan, Cory, NC
4,880 Shen Mansell, Calgary, Alberta

FOOTBALL *(Radio Shack)*
256-0 ★Mike Garozzo, Morrisville, PA
217-0 Giacomelli, Woodbridge, Ontario
161-0 David Hart, Salt Lake City, UT

THE FROG *(Tom Mix)*
156,000 ★Evelyn Gagnon, North Bay, Ontario

FROGGIE *(Spectral Associates)*
86,010 ★David Garozzo, Morrisville, PA
84,440 Bill Ide, Newark, DE
74,050 Mike Garozzo, Morrisville, PA

FURY *(Computer Shack)*
78,200 ★Jon Jenkins, Milner, GA

GALAGON *(Spectral Associates)*
647,230 ★Jack A. Tindle, Soquel, CA
386,950 Robert Ahlgrim, Hutchinson, KS
286,741 Rod Moore, Fork Union, VA
188,130 Daryl Judd, Nampa, ID
183,180 Lori Heape, Hutchinson, KS

GALACTIC ATTACK *(Radio Shack)*
48,870 ★Tony Boring, Armagh, PA
48,520 ●Paul Sanecki

GALAX ATTAX *(Spectral Associates)*
253,900 ★Shawn McAlpin, Louisville, KY
113,650 Darrin Filand, WA
104,550 Mitch Hayden, Univ. of Minn.
82,650 Steve Hargis, Tucson, AZ
74,550 John Gosselin, Campbell River, British Columbia

GANGBUSTERS *(Prickly-Pear)*
18,650,425 ★Michael Rosenberg, Prestonburg, KY

GHOST GOBBLER *(Spectral Associates)*
1,007,430 ★Todd Brannam, Charleston Hts., SC
825,250 Randy Gerber, Wilmette, IL
423,390 Rich McGervey, Morgantown, WV
255,000 John Osborne, Kincardine, Ontario
228,290 Patricia Lau, York, PA

GLAXXONS *(Mark Data)*
18,984 ★Luc Poliquin, Montreal, Quebec

GLOMMER *(*THE RAINBOW*)*
154 ★Susan Ballinger, Uxbridge, Ontario

GONE FISHING *(The Rainbow)*
12 ★Kevin Oberberger, Sparks, NV
11 Emily Doubt, Deep River, Ontario
10 Mike Cook, Dixon, IL
10 Doug Schwartz, Glendale, AZ

SCOREBOARD

9 Jeffrey Kochs, Grove City, OH
9 Mona Young, Sheffield, MA

GRABBER *(Tom Mix)*
147,600 ★Brian Foley, Blackstone, MA
129,100 ●Blossom Mayor, East Greenbush, NY
70,600 Michael Corman, Lafayette, IN
27,750 Ellen Ballinger, Uxbridge, Ontario
10,050 Anthony Schmuck, Wellsville, PA

GREY LADY *(Jarb Software)*
58,300 ★Bertha Jeffries, San Bernardino, CA

HEIST *(*THE RAINBOW*)*
2,100 ★Sergio Waisser, Mexico City, Mexico
1,500 Julio Comello, Scarborough, Ontario
1,500 ●Andy Dater, Medford, OR
1,500 Joel Lombardi, Newark, DE
1,500 ●Jeff Roberg, Winfield, KS
1,500 Kevin Speight, Bridgewater, Nova Scotia
1,500 Rupert Young, Sheffield, MA

ICE MASTER *(Arcade Animation)*
312,150 ★Stephane Asselin, Hauterive, Quebec

JUNGLE ADVENTURE (THE RAINBOW)
870,333 ★Tony Boring, Armagh, PA
4,230 Doug Schwartz, Glendale, AZ

JUNIOR'S REVENGE *(Computerware)*
3,007,000 ★Tim Brown, Clio, MI
2,154,900 Scott Kubota, Whitby, Ontario
2,099,300 Shawn McAlpin, Louisville, KY
1,220,000 Edwin Prather, Oxnard, CA
1,115,300 Ryan Van Manen, Grand Rapids, MI

KATERPILLAR ATTACK *(Tom Mix)*
31,672 ★Scott Fairfield, Williamstown, MA
25,949 James A. Lafare, Williamstown, MA
18,949 Vadim Gotovsky, Toronto, Ontario
15,821 Alex Gotovsky, Toronto, Ontario
5,426 Russ Rosen, Cardiff, CA

KEYS OF THE WIZARD *(Spectral Associates)*
662 ★Susan Ballinger, Uxbridge, Ontario
662 ★Pegi Tindle, Soquel, CA
662 ★Ellen Ballinger, Uxbridge, Ontario

KING TUT *(Tom Mix)*
130,200 ★Alan Higgs, Calgary, Alberta

THE KING *(Tom Mix)*
10,000,100 ★Mark Smith, Santa Ana, CA
4,040,300 Andy Truesdale, Ferguson, MO
3,343,000 Corey Friedman, Minnetonka, MN
2,410,200 Candy Harden, Birmingham, AL
2,367,900 Richard Lacharite, Sherbrooke, Quebec

KLENDATHU *(Radio Shack)*
1,962,741 ★Jay Pribble, Davenport, IA
1,245,821 John Sandberg, Concord, CA
1,193,350 Tommy Parker, Talladega, AL
1,182,685 David L. Ferris, Shickshinny, PA

LANCER *(Spectral Associates)*
2,797,450 ★Randall Edwards, Dunlap, KS
2,354,000 Alex State, Las Vegas, NV
875,150 Larry Capen, Folsom, CA
736,250 Sharon Casten, Folsom, CA
617,500 Donna Willoughby, Brookfield, IL
54,050 Kevin Speight, Bridgewater, Nova Scotia

LASERWORM & FIREFLY *(*THE RAINBOW*)*
116,622 ★Michael Rosenberg, Prestonburg, KY
94,748 ●Brian Chafin, Weyers Cave, VA
67,515 Marco Swinkels, Beneluxlaan, Netherlands
45,194 Theodore Latham Jr., Rich Square, NC
43,420 Eric Morrell, Sayreville, PA

LUNAR ROVER PATROL *(Spectral Associates)*
162,100 ★Sara Aliff, Northeast, MD
154,650 Tom Aliff Jr., Northeast, MD
66,900 Wayne Johansen, Rocanville, Saskatchewan
66,850 Randall Edwards, Dunlap, KS
47,250 Curtis Frazier, Jr., Enterprise, AL

MARATHON *(*THE RAINBOW*)*
204,630 ★T.J. Massey, Montreal, Quebec
109,330 ●Jimmy Morse, St. John, WA
101,520 David Dean, West Mansfield, OH
71,550 Larry Evans, Elk Grove Village, IL

MAZELAND *(Chromasette)*
3,050 ★Mark Kromeke, Albuquerque, NM

MAZE PANIC *(New Horizons Group)*
12,080 ★Paul Sanecki

MEGA-BUG *(Radio Shack)*
60,000 ★Robin Worthem, Milwaukee, WI
18,902 John Tiffany, Washington, DC
15,999 Ed Mitchell, Ragged Mountain, CO
14,297 Aleisha Hemphill, Los Angeles, CA
11,894 Paschal Wilson, Kentwood, LA

METEORS *(Spectral Associates)*
26,580 ★Kevin Endlich, Perry Hall, MD
16,870 Keith Marsh, Bokeelia, FL
14,200 Craig Dutton, Goose Bay, Labrador

MICROBES *(Radio Shack)*
178,550 ★Apollo Latham, Rich Square, NC
144,350 Theodore Latham Jr., Rich Square, NC

MISS GOBBLER *(Procolour Group)*
59,900 ★Cathy Anderson, Carnegie, OK

MONSTER MAZE *(Radio Shack)*
708,460 ★Scott Daley, Biloxi, MS
650,530 ●Bruce March, Barrie, Ontario
533,450 John Hankerd, Gaines, MI
495,850 Andrew Mitchell, Melbourne, Australia
300,000 James Stevenson, Marshall, TX
67,160 Theodore Latham Jr., Rich Square, NC

MOON HOPPER *(Computerware)*
114,540 ★Susan Ballinger, Uxbridge, Ontario
53,570 Robert Harmon, Virginia Beach, VA

MR DIG *(Computerware)*
2,301,000 ★Jeff Roberg, Winfield, KS
1,976,500 Tim Magnusen, Lafayette, TN
888,700 Thomas Henry, Boca Raton, FL
784,500 Marc Harris, Colorado Springs, CO
522,150 Dwight Elliott, Pompton Lakes, NJ
378,150 Catherine Henry, Boca Raton, FL
320,400 Rick Crossfield, Harrodsburg, KY
166,700 Scott Menzies, Novar, Ontario

MUDPIES *(MichTron)*
185,200 ★Bertha Jeffries, San Bernardino, CA
164,000 Paul Baker, Pittsburgh, PA
156,800 Glenn Wasson, Castleton, NY
147,400 Chris Hafey, Auburn, CA
124,400 Bernd Pruetting, Scheibenhardt, West Germany
117,000 Chad Bunovich, Wilmerding, PA
57,300 Paul Tisdel, Les Saules, Quebec

NINJA WARRIOR *(Programmer's Guild)*
151,100 ★Douglas Rodger, Harvard, MA
106,300 Bud Seibel, Tumbler Ridge, British Columbia
105,200 Martin W. Grimm, Elkview, WV
102,400 Christopher Gelowitz, Claresholm, Alberta
86,100 Ryan Sambrook, Miami Lake, FL

OFFENDER *(American Business Computers)*
113,000 ★Kevin Marsh, Bokeelia, FL
103,450 Julio Comello, Scarborough, Ontario

OUTHOUSE *(MichTron)*
530,751 ★Rosalie Siclari, Staten Island, NY
528,694 Benjamin Hebb, Bridgewater, Nova Scotia
160,200 David Lazar, Englishtown, NJ
101,650 Davey Devlin, Clyde, NC
69,848 Phillip Laurell, Lansing, MI

PAC 'EM *(*THE RAINBOW*)*
2,080 ★Stephanie Gregory, Coco Solo, Panama
1,999 Kevin R. Hubbard, Huntington, WV
1,951 Dr. James Peterson, Radcliff, KY
1,870 Steve Olson, Calgary, Alberta
1,631 Raymond R. Hubbard, Huntington, WV
495 Cameron Grant, Stettler, Alberta
256 Brad Dingey, Stettler, Alberta

PARA-JUMPER *(*THE RAINBOW*)*
822 ★Peter MacLeod, Montague, Prince Edward Island

PHANTOM SLAYER *(Med Systems Software)*
2,668 ★Michael Brooks, Glade Spring, VA
2,488 Troy Messer, Joplin, MO
1,852 Curtis Boyle, Saskatoon, Saskatchewan
1,306 Marc Hassler, Gainesville, FL
1,126 Gille Giroux, North Bay, Ontario

PICTURE PUZZLE *(DSL Products)*
30,126 ★Vicki Ineson, Westland, MI

PINBALL *(Radio Shack)*
12,000,000 ★Gerry Farmer, Calgary, Alberta
2,800,090 Glen Ewing, Brooklin, Ontario

PLANET INVASION *(Spectral Associates)*
177,900 ★Russ Rosen, Cardiff, CA

POLARIS *(Radio Shack)*
261,341 ★Nico Swinkels, Beneluxlaan, Netherlands
111,273 Scott Daley, Biloxi, MS
91,168 Ed Meyer, Vancouver, British Columbia
81,041 Andy Lehtola, Mound, MN
63,053 Paschal Wilson, Kentwood, LA

POLTERGEIST *(Radio Shack)*
6,730 ★Walker Astle, Grimsby, Ontario
6,600 ●Ray Suplee

POOYAN *(Datasoft)*
1,511,050 ★Jeff Connell, Winona, MN
1,138,500 ●Linda Cote, Montreal, Quebec
890,850 Jerry Morgan, Independence, MO
480,450 Bernd Pruetting, Scheibenhardt, West Germany
288,550 Mark B. Rodda, Springfield, VA
132,850 Jeffrey DuBois, Houma, LA

POPCORN *(Radio Shack)*
64,380 ★Susan Rushing, Tucson, AZ
57,860 Jeffrey Kochs, Grove City, OH
48,930 ●Paul Baker, Pittsburgh, PA
47,110 Darin Martin, Oakland, CA
46,900 Dan Raltenbaugh, Sandy Lake, PA
38,560 Matthew Foye, Middleboro, MA
35,420 Jeff Lupish, Grimsby, Ontario
19,230 Chris Shannon, Lafayette, IN

PROJECT NEBULA *(Radio Shack)*
1,270 ★Theodore Latham Jr., Rich Square, NC
1,145 ●Barry Logan, Pinckneyville, IL
1,120 John Hopkins, Greenville, SC
1,065 William Daley, Biloxi, MS
1,065 Dan Heater, Cortland, OH
185 Bobby Rosingana, Danville, CA

PYRAMID *(Radio Shack)*
220/113 ★John Dupre, Mobile, AL
220/130 Cornelius Caesar, Gundelhardtstr, West Germany
220/130 George R. Fairfield, Victoria, British Columbia
220/133 Robert Dickau, Sacramento, CA
220/136 Andy Nelson, Winona, MN
220/137 ●Chris Cope, Central, SC
220/139 Shawn Williams, Connersville, IN
220/147 Stephen Su, Niles, MI
220/151 Randall Edwards, Dunlap, KS
220/156 Richard Bourque, Gatineau, Quebec
220/ Judy Fodness, Mesa, AZ

Q-NERD *(*THE RAINBOW*)*
6,512,020 ★Ray Ravalitera, Bethune, France
184,780 Ray Suplee
181,920 Susan Bennington, Pensacola, FL
130,000 Robert Dickau, Sacramento, CA
30,900 Kevin Oberberger, Sparks, NV
29,830 Theodore Latham Jr., Rich Square, NC
24,900 Nicole Freedman, Wellesley, MA
4,770 Rupert Young, Sheffield, MA

QUASAR COMMANDER *(Radio Shack)*
114 ★Paul Sanecki

QUIX *(Tom Mix)*
540,016 ★Wib Merrthew, Oshawa, Ontario
496,165 Evelyn Gagnon, North Bay, Ontario

RAAKA-TU *(Radio Shack)*
25 ★Brian Sobolewski, Orange Park, FL
40 David Joyner, Raleigh, NC

RAINBOW ROACH *(*THE RAINBOW*)*
283,500 ★Andy Lehtola, Mound, MN
124,800 ●Cheryl Endlich, Perry Hall, MD
122,700 Peter MacLeod, Montague, Prince Edward Island
113,500 Andrew Smith, Columbia, SC
102,000 John Statham, Strathroy, Ontario

REACTOIDS *(Radio Shack)*
931,395 ★Linda Mobbs, Pt. Huron, MI
203,800 Andrew Lehtola, Mound, MN
88,615 Robbie Anderson, Monrovia, CA
41,100 Jeff Loeb, Mobile, AL

MORE... RAINBOW SCOREBOARD

RETURN OF THE JET-I *(ThunderVision)*	
389,453	★Gary Bachtel, Huntsville, AL
208,602	Robert Buerkle, Conway, PA
ROBOTTACK *(Intracolor)*	
2,437,000	★Mike Scharf, Fremont, OH
2,329,000	Edwin Prather & Cory Soper
2,216,950	Randy Hankins, Tabor, IA
1,922,200	Erik Merz, Noblesville, IN
1,512,200	Robert Kiser, Monticello, MS
SEA DRAGON *(Adventure International)*	
538,200	★Kevin Oberberger, Sparks, NV
SCARFMAN *(Cornsoft)*	
412,050	★Michael Cerami, Springfield, VA
357,190	Jeremy Schild, Clinton, UT
261,850	Kristin McGahee, Pembroke Pines, FL
253,920	Scott Boulanger, Columbus, OH
SHOOTING GALLERY *(Radio Shack)*	
120,640	★Robert J. Wallace, Waldorf, MD
67,700	Vernell Peterson, Radcliff, KY
44,870	Mark Nichols, Birsay, Saskatchewan
44,480	R. Duguay, St. Bruno, Quebec
31,340	Martin Peterson, Lynchburg, VA
SKIING *(Radio Shack)*	
05.85	★John Hokpins, Greenville, SC
12.08	Kelly Kerr, Wentzville, MO
13.73	Janell Stroshane, Ashland, WI
21.35	Jean-Claude Taliana, Brossard, Canada
29.52	Andrew Truesdale, Ferguson, MO
SLAY THE NEREIS *(Radio Shack)*	
344,115	★Ed Meyer, Vancouver, British Columbia
116,588	Peter MacLeod, Montague, Prince Edward Island
110,000	Mike Butenhoff, Minnesota City, MN
48,226	Nicole Freedman, Wellesley, MA
SNAIL'S REVENGE (THE RAINBOW)	
10,860	★Rupert Young, Sheffield, MA
SNAKER (THE RAINBOW)	
1:26	★Dan Sobczak, Mesa, AZ
1:59	Baiju Shah, Deep River, Ontario
SPACE SHUTTLE *(Tom Mix)*	
595	★Steve Schweitzer, Sewell, NJ
585	David J. Banks, Greendale, British Columbia
585	Kenton Fifield, Fort Francis, Ontario
585	Randall F. Edwards, Dunlap, KS
576	David J. Banks, Greendale, British Columbia
SOLO POKER *(Datasoft)*	
980	★Carol Dawn Staker, Moscow, ID
850	Granville Bonyata, Tallahasse, FL
740	Allan Mercurio, Portsmouth, RI
450	Kevin Marsh, Bokeelia, FL
STAR TREK *(Adventure International)*	
100	★Stefan Mecay, Austin, TX
STORM ARROWS *(Spectral Associates)*	
168,000	★Steven Ohsie, Deer Park, TX
136,650	Brian Specht, Rochester, NY
68,400	Jim Irvine, Sudbury, Ontario
STRATEGY FOOTBALL (THE RAINBOW)	
201-0	★Dan Sobczak, Mesa, AZ
TIME BANDIT *(MichTron)*	
243,620	★Mark Wooge, Omaha, NE
214,850	Sally Naumann, Hailey, ID
129,240	Brian Larrson, Fridley, MN
106,720	Glen Heidebrecht, Topeka, KS
66,700	Fred Naumann, Hailey, ID
48,950	Mario Asselin, Hauterive, Quebec
TIME FIGHTER *(Mark Data)*	
72,400	★Robert Shaw, Kincardine, Ontario
TOUCHSTONE *(Tom Mix)*	
65,520	★Kevin Marsh, Bokeelia, FL
TRAILIN' TAIL (THE RAINBOW)	
76,275	★Michael Rosenberg, Prestonsburg, KY
33,454	Kenneth Bergenham, Lawton, MI
26,640	Dr. James Peterson, Radcliff, KY
24,415	Kenton Fifield, Fort Frances, Ontario
19,820	Dan Sobczak, Mesa, AZ
TRAPFALL *(Tom Mix)*	
120,406	★Keith Marsh, Bokeelia, FL
114,322	David Joyner, Raleigh, NC
113,408	Rich Trawick, N. Adams, MI
112,596	Kanti Dinda, Kingston, Ontario
112,404	Russ Rosen, Cardiff, CA
105,668	Gary Bachtel, Huntsville, AL
TUT'S TOMB *(Mark Data)*	
163,060	★Michael McCafferty, Oceanside, CA
158,000	●Chris Russo, Miami, FL
121,240	Mickey McCafferty, Oceanside, CA
106,460	Eileen Kaakee, Royal Oak, MI
104,360	Gary Marshall, Layton, UT
76,200	Alexandre Maggioni, Lausanne, Switzerland
WACKY FOOD *(Arcade Animation)*	
227,900	★Jon Jenkins, Milner, GA
105,100	Stephane Asselin, Hauterive, Quebec
WHIRLYBIRD RUN *(Spectral Associates)*	
516,450	★Dan Shargel, Arroyo Grande, CA
283,100	Nathan Russell, Minco, OK
157,000	Hughens Bien-Aime, Montreal, Quebec
104,000	Jeff Connell, Winona, MN
103,900	Dann Fabian, Crestview, FL
ZAXXON *(Datasoft)*	
1,510,000	★James Quadrella, Brooklyn, NY
666,000	Andy Green, Whitehall, PA
401,900	Mike Hughey, King George, VA
370,400	Chris Coyle, Selden, NY
260,600	Roger Buzard, Lima, OH
119,000	Donald Hummer, Reynoldsburg, OH
108,600	Apollo Latham, Rich Square, NC
100,900	Paschal Wilson, Kentwood, LA
78,500	Matthew Foye, Middleboro, MA

— Tamara Solley

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints and tips, we encourage you to share them by sending them to the Scoreboard, c/o THE RAINBOW.

ADVENTURE P.I.

Scoreboard:

I have solved *Sea Quest* after a few months of agony. The hardest piece of treasure to find is the diamond ring. It can be found by getting the shovel and metal detector, then going up the stairs on the beach and south. Activate the metal detector and dig; there it appears!

I have also solved many other graphics Adventures. If you would like clues, send a self-addressed, stamped envelope to me at 1755 King Edward St., R2R 0M3.

Robert Black
Winnipeg, Manitoba, Canada

Scoreboard:

I recently discovered that on *Heist* (THE RAINBOW May '84) if you go down to the score (loot) you can score points, and if you go to the high score you can also score points. There is another trick to this. First of all, score with a bag, then touch the score and high score. After that, touch another bag and again touch the score, and so on until you finish all your bags on the screen. In the second screen do the same as on the first screen (remember to touch the high score), and after finishing up this screen do the same on the third. Every time I play there is plenty of time left.

Sergio Waisser
Mexico City, Mexico

Scoreboard:

I have recently solved *Sea Quest*. If anyone would like hints or the solution, write to me at 2655 Columbia, 48072. I also have completed *Bedlam*.

Has anyone solved *The Crown of Merro* (THE RAINBOW Feb. '84)? If so, please send me the solution. I have gotten to the cave, but always die from the poison.

Laura Conley
Berkley, MI

Scoreboard:

As was suggested in your "Pointers" column (THE RAINBOW June '84), I tried to FOLLOW different people in *Bedlam*. After I typed "follow so-and-so," it asked me for a phrase. What should I do now? Please write to me at Rt. 1, Box 45-M, 24486.

Brian Chafin
Weyers Cave, VA

Scoreboard:

Help! I would greatly appreciate any clues and/or solutions to *Pyramid*, *Madness and the Minotaur*, and *Bedlam*. If anyone can assist me, please write to me at: COMSUBRON 14, Fleet Post Office, NY 09501.

David Sharpe
Dunoon, Scotland

EXTRA POKES

Scoreboard:

Here is a complement to Tom Fagan's tips in the July '84 issue of THE RAINBOW. The following is a list of *POKEs* to aid you by increasing the number of allotted players. The 'x' represents the number of lives you want:

POKE 13971, x	*Bag-It-Man*
POKE 21561, x	*Mr. Dig*
POKE 22369, x	*Lunar Rover Patrol*
POKE 29629, x	*Mudpies*
POKE 17437, x	*Tutankam*
POKE 8274, x ; 8318,x	*Zeus*

Jean Tisdel
Les Saules, Quebec

Scoreboard:

In the July '84 edition of THE RAINBOW, there is a list of *POKEs* for gaining "everlasting life." I know a little about computers, but do not know how to use *POKE*. I typed in what it said beside *The King* and the comput er responded with a syntax error. Would you please advise on how to use the *POKE* command?

Andrew Smith
Grimsby, Ontario

Editor's Note: Refer to your Sept. '84 edition of THE RAINBOW under "Scoreboard Pointers" — there is an explanation in the "Editor's Note."

MYSTERY OF THE PYRAMID

Scoreboard:

I think that there is more to *Pyramid* than meets the eye. In certain rooms, when you are carrying certain objects, hitting ENTER will result in a message. It will be something like "lamp here," "plant here," or "sarcophagus here." If you drop the desired object, hitting ENTER will result in an "I don't understand" instead of another prompt. Could anyone help me find out what rooms correspond with what objects, and, finally, what the end result is? My address is 14925 Satanas St., 92129.

Jon Blow
San Diego, CA

Scoreboard:

This is for everybody who has had trouble with the maze in *Pyramid*. After entering the maze, use the following sequence: E,S,S,S, N,E,E,NW. Next, get everything in the area. After that, type SE,N, and D.

If anybody has hints for *Raaka-Tu*, please send them to me at 1528 40th Street, 95819. Also, if you need hints/ answers for *Pyramid*, write to me.

Robert Dickau
Sacramento, CA

ZAPPING THE ENEMY

Scoreboard:

To destroy all the enemy planes in space on *Zaxxon*, use the following procedure: Immediately after leaving the fortress, position your plane exactly halfway up the screen (the height indicator will be exactly in the middle of the space between the third and fourth lines) and roughly halfway across the screen. When the first plane appears, it should be directly in your sight; if not, position your plane so that it is, and destroy the enemy plane. Then begin firing as fast as you can. If your plane is correctly placed on the screen, all the enemy planes will fly into your fire, without having to move the plane at all. If the enemy planes are not destroyed immediately, don't worry; the enemy planes have three flight patterns, and eventually will lead into your line of fire.

This method works well through the first three sets of planes, and moderately well after that. The planes that come in from behind you on levels beyond the first robot will be destroyed, also. If anyone has any questions on this method, or if they want a more detailed explanation, they may write to me at 607 Avenue K, 70444.

Paschal Wilson
Kentwood, LA

OVERCOMING CREATURES

Scoreboard:

I've finally solved *Dungeons of Daggorath*, and have a clue that may help someone. When fighting creatures always have treasure laying in front of you in the same space. The creatures will try to get the weapons or treasures before they attack you, giving you time to attack them. (This doesn't work with the Scorpion or the Wizards.)

I have also solved *Sands of Egypt*, *Calixto Island* and *Keys of the Wizard*. If anyone has any questions write to me at 104 Barely Ct., 20653.

Kelly Bussell
Lexington Park, MD

JUNGLE JINX

Scoreboard:

I found a small flaw in the program *Jungle* (THE RAINBOW, Aug. '84) that might be helpful. Add Line 2643 which should read *2643 S=0* because every time you play, your score builds from the previous game and it could end up being hundreds of thousand!

Doug Schwartz
Glendale, AZ

Scoreboard:

After your score reaches 10,000 on *Polaris*, be careful that it doesn't go over 1,000 above a bonus island on the multiples of 10,000. For example: starting a wave on 49,000 and ending on 51,000 or starting on 29,000 and ending on 31,000 — this will negate your bonus island.

Andy Lehtola
Mound, MN

AWESOME ASSIGNMENT

Scoreboard:

I'm having difficulty in solving the *Arconiax Assignment* Adventure game (THE RAINBOW July '84). My main problem is getting on the country streets. Any help would be greatly appreciated. Send information to 6 Jones Dr., 25560.

Larry Kinder
Scott Depot, WV

Scoreboard:

I would like to know how to produce Hi-Res graphics with all eight CoCo colors, as done on such games as *Storm* and *Pac-Tac*. Can this be done in BASIC, or does it require machine language? If anyone can help, please send information to 7719 Pipers Creek, 78251.

Scott Power
San Antonio, TX

STUCK IN SPACE

Scoreboard:

I recently bought an Adventure game from Pal Creations called *Space Escape*. I am having a problem getting out of the ship. I cannot get the shuttlecraft door open.

If anyone knows the solution to my problem, please write to me at 1127 Mountainbrook, 71118.

Robert Aylor
Shreveport, LA

Color LOGO With Printing

By Don Inman
Rainbow Contributing Editor

One advantage that Color LOGO has over Extended Color BASIC is the ability to print text on the display screen along with graphics. The *PRINT* command can be used to add prompts and other information to a graphics screen. Since the printed information is displayed at the turtle's current location, the turtle must be moved to the desired position before the *PRINT* command is given. It is also desirable to hide the turtle before printing so that the information is clearly readable. An alternative is to move the turtle away from the printed information when finished.

The *PRINT* command can be used in either of the following two forms.

1) PRINT t
↑
The "t" can be a number, a variable, a function reference, or a combination of these and any arithmetic, logic, or relational operators.

Examples:

PRINT 5 — will print the number 5.

PRINT :ROW — will print the numeric value that has been assigned to the variable :ROW.

PRINT ABS :N — will print the absolute value of the numeric quantity of the variable :N. If :N=-5, it would print 5.

PRINT :ROW+3 — will print the sum of the numeric value of :ROW and 5.

2) PRINT "text" — will print whatever text is inside the quotation marks.
↑
"text" can be composed of any printable keyboard symbols (letters, numbers, punctuation, etc.). Text must be enclosed in quotation marks.

Examples:

PRINT"RESULTS OF THROWS OF A SINGLE DIE"

PRINT"1 2 3 4 5 6"

To demonstrate a typical use of the *PRINT* command, consider the following procedures that allow you to test the *RANDOM* function by repeated throws of a single die.

Listing 1:

```
TO HEXTOSS :TOSSES
 ZERO
 REPEAT :TOSSES
    (MAKE :N RANDOM 6+1
     CHANGE)
 DRAW
END

TO ZERO
 MAKE :ONE 0  MAKE :TWO 0
```

(Don Inman taught in the public school system for over 21 years. After a one-year sabbatical to investigate educational uses of computers, he never went back to the classroom.)

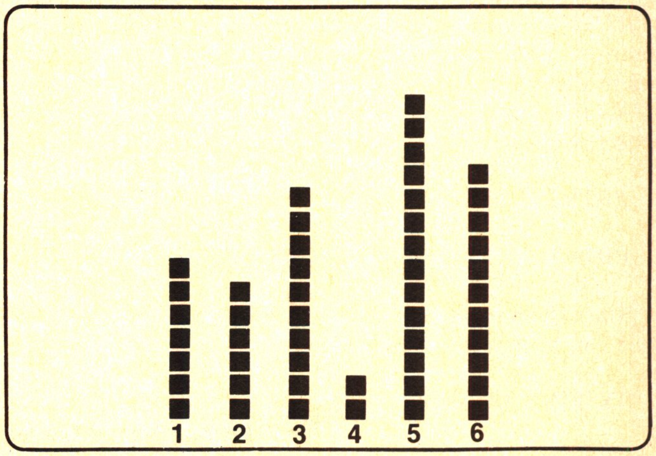
```
 MAKE :THREE 0   MAKE :FOUR 0
 MAKE :FIVE 0   MAKE :SIX 0
END

TO CHANGE
 IF :N=1
   (MAKE :ONE :ONE+1)
 IF :N=2
   (MAKE :TWO :TWO+1)
 IF :N=3
   (MAKE :THREE :THREE+1)
 IF :N=4
   (MAKE :FOUR :FOUR+1)
 IF :N=5
   (MAKE :FIVE :FIVE+1)
 IF :N=6
   (MAKE :SIX :SIX+1)
END

TO DRAW
 CLEAR HT
 SX 30   SY 4   PRINT 1
 SX 70   PRINT 2
 SX 110   PRINT 3
 SX 150   PRINT 4
 SX 190   PRINT 5
 SX 230   PRINT 6
 SX 25   SY 10   SH 90
 REPEAT :ONE
   (BLOCK)
 SX 65   SY 10
 REPEAT :TWO
   (BLOCK)
 SX 105   SY 10
 REPEAT :THREE
   (BLOCK)
 SX 145   SY 10
 REPEAT :FOUR
   (BLOCK)
 SX 185   SY 10
 REPEAT :FIVE
   (BLOCK)
 SX 225   SY 10
 REPEAT :SIX
   (BLOCK)
END

TO BLOCK
 REPEAT 2(FD 5   LT 90
   FD 1   LT 90   FD 5   RT 90
   FD 1   RT 90)
 FD 5   PU   BK 5   LT 90
 FD 2   RT 90   PD
END
```

To use these procedures you must have a Color LOGO cartridge or diskette in the computer. The *RUN* mode is used to execute the procedures by entering:

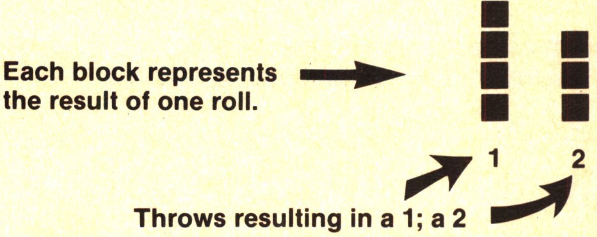
```
HEXTOSS 50 ENTER
```

for 50 die throws

The results of our sample run looked like this.



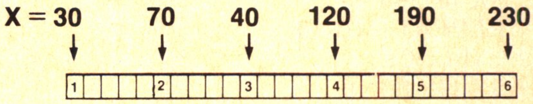
The result of each roll of the die is represented by one block of a bar of the graph.


Each block represents the result of one roll.
1
2
Throws resulting in a 1; a 2

The *PRINT* command was used to number the bars in the *DRAW* subprocedure as follows:

```
SX  30 SY 4 PRINT 1
SX  70 PRINT 2
SX 110 PRINT 3
SX 150 PRINT 4
SX 190 PRINT 5
SX 230 PRINT 6
```

Notice that the X coordinate is increased 40 units for each print command. Since each character occupies eight-column positions, the numbers are placed 40/8 or five-character spaces apart. Therefore, there are four blank character spaces between each letter.



Using the "text" form of the *PRINT* statement, the same spacing can be achieved by:

```
SX 30 SY 4
PRINT"1    2    3    4    5    6"
                ↑
                four spaces between numbers
```

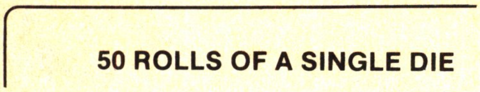
The display used for HEXTOSS did not contain much information. The bars indicated the frequency distribution of the results of throwing a single die. However, the display gives no indication of what is being shown. Additional *PRINT* statements can be used to provide additional information. You might want to display a title and show how many die rolls have been made. You only need to change the *DRAW* subprocedure to do this. For demonstration purposes, we will use:

```
PRINT :TOSSES

PRINT"ROLLS OF A SINGLE DIE"
```

Since the bars are labeled at the bottom of the screen, the title can be placed at the top by:

```
SX 30 SY 180 PRINT :TOSSES
                 ↖ Print number of tosses
SX 62                  ← Move to right

PRINT"ROLLS OF A SINGLE DIE"  ← Print text
```

These three lines provide the following title which begins at the top left of the screen (position 30,180).



The final version of the DRAW subprocedure is as follows:

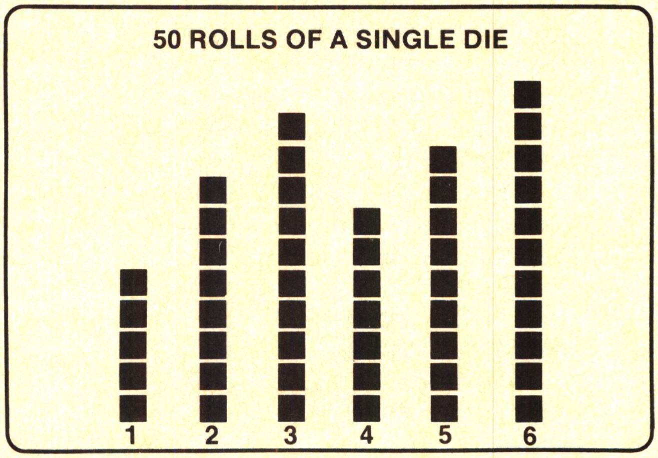
```
TO DRAW :TOSSES              ←
  CLEAR HT
  SX 30  SY 4
  PRINT"1  2  3  4  5  6"    ←
  SY 180  PRINT :TOSSES      ←
  SX 62                      ← lines changed
  PRINT"ROLLS OF A SINGLE DIE" ←
  SX 25  SY 10  SH 90
  REPEAT :ONE
    (BLOCK)
  SX 65  SY 10
  REPEAT :TWO
    (BLOCK)
  SX 105  SY 10
  REPEAT :THREE
    (BLOCK)
  SX 145  SY 10
  REPEAT :FOUR
    (BLOCK)
  SX 195  SY 10
  REPEAT :FIVE
    (BLOCK)
  SX 235  SY 10
  REPEAT :SIX
    (BLOCK)
END
```

The title of the main procedure is changed to HEX TOSS2, and the command which calls the *DRAW* subprocedure is changed to add the variable :TOSSES. This passes the value of :TOSSES from the main procedure to the *DRAW* subprocedure so that it can be printed in the title. The main procedure is now:

```
TO HEXTOSS2 :TOSSES
  ZERO
  REPEAT :TOSSES
    (MAKE :M RANDOM 6+1
    CHANGE)
  DRAW :TOSSES
END
```

All the other subprocedures remain the same. When the revised *DRAW* subprocedure is used with HEXTOSS2, a sample run looked like this:

Figure 2



Listing 2:

```
TO HEXTOSS2 :TOSSES
 ZERO
 REPEAT :TOSSES
   (MAKE :N RANDOM 6+1
    CHANGE)
 DRAW :TOSSES
END

TO ZERO
 MAKE :ONE 0   MAKE :TWO 0
 MAKE :THREE 0   MAKE :FOUR 0
 MAKE :FIVE 0   MAKE :SIX 0
END
```

```
TO CHANGE
 IF :N=1
   (MAKE :ONE :ONE+1)
 IF :N=2
   (MAKE :TWO :TWO+1)
 IF :N=3
   (MAKE :THREE :THREE+1)
 IF :N=4
   (MAKE :FOUR :FOUR+1)
 IF :N=5
   (MAKE :FIVE :FIVE+1)
 IF :N=6
   (MAKE :SIX :SIX+1)
END

TO DRAW :TOSSES
CLEAR HT
SX 30  SY 4  PRINT 1
PRINT"1    2    3    4    5    6
SY 180  PRINT :TOSSES
SX 62
PRINT"ROLLS OF A SINGLE DIE"
SX 25  SY 10  SH 90
REPEAT :ONE
  (BLOCK)
SX 65  SY 10
REPEAT :TWO
  (BLOCK)
SX 105  SY 10
REPEAT :THREE
  (BLOCK)
SX 145  SY 10
REPEAT :FOUR
  (BLOCK)
SX 185  SY 10
REPEAT :FIVE
  (BLOCK)
SX 225  SY 10
REPEAT :SIX
  (BLOCK)
END

TO BLOCK
 REPEAT 2(FD 5  LT 90
   FD 1  LT 90  FD 5  RT 90
   FD 1  RT 90)
 FD 5  PU  BK 5  LT 90
 FD 2  RT 90  PD
END
```

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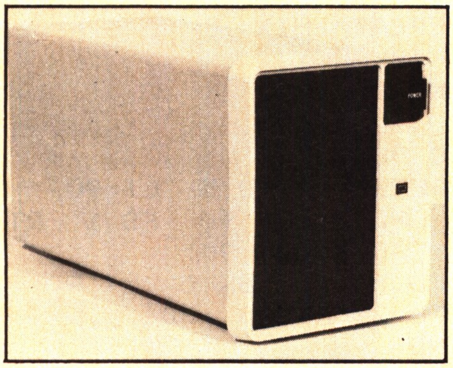

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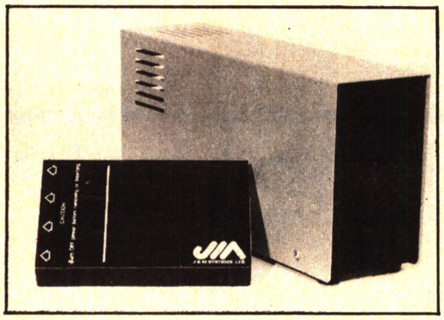

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Cooking With CoCo

Part IV

This month the chef serves up a tasty appetizer to make keyboard entry deliciously easy.

By Colin J. Stearman

If you were paying close attention last month, you might have noticed I included a couple of items in the patch listing which were not mentioned in the text of the article. These were put in at the last minute due to the overwhelming number of reader requests for them. Before we get started on this month's feature, I will describe what they were.

DECB 1.1

It seems more of you have the new revision of Disk BASIC than I imagined, and were frustrated by this series being based on the 1.0 revision. Well fret no more, as the part three listing contains patch addresses for both revisions. I have used MAC's conditional assembly to select which revision to assemble. If the label *REV* is zero then the 1.0 version is built and if it's one then 1.1 is built. The listing each month will be assembled for 1.0, but all information will be included regarding what to change for 1.1.

DECB 1.1 takes up more room in the ROM than does 1.0, so I have had to leave some features out. First to go is the fix to the *FILES* command. I haven't checked, but would like to think that 1.1 fixed that bug itself. Second, the fully spelled out error messages and return of the error message name in

---

(Colin J. Stearman is an electronics engineer educated in the U.K. He has worked with all kinds of computers and has been a CoCo enthusiast for over two years.)

ENAME$* had to go. These seemed like the least important, but if you disagree, leave something else out and include them. But whatever you do, don't let the additions go beyond *$DEFF. The OS-9 boot routine resides at *$DF00* through *$DF4C*.

Finally, each month RAINBOW ON TAPE will have the machine code file for both revisions of BASIC. The name of the file will be built from the initials of the article, the part number and then V10 for *DECB1.0* and V11 for *DECB* 1.1. So this month the files will be *CWC4V10* and *CWC4V11*.

Drive Step Rate

Many of you have disk drives that can step from track to track at a rate faster than the 30 ms (milliseconds) set by BASIC. Even my old RS drives can step at 20 ms.

If you look at last month's listing Lines 225 through 232, you will see that I adjusted the rate to 20 ms. That's why your drives sounded a little strange. If you had problems maybe you should set this back to 30 ms.

There are four possible settings; 30 ms, 20 ms, 12 ms and 6 ms. This patch will affect all your drives equally, so set the value to that of the slowest drive, if you have a mix. I have patched both the RESTORE rate and SEEK rate. The first sets the rate at which the drive is restored to track zero; the second, the rate at which each track is sought. I toyed with making a command to allow BASIC to change the rate "on the fly." But that takes up precious ROM space and you would always want the fastest rate your drives can handle. If you don't know how fast your drives are, keep reducing the rate until a *LOAD* command fails, then go back a notch.

Back to Business

Last month we ended the assembly code listing with a series of dummy functions. Next month we will add the code to make some of them functional. But this month we introduce FLEXIKEY.

Hands up all of you CoCo keyboard-pounders who have just entered a long direct command to BASIC, only to notice a "typo" in the second character. I guess I'm not alone! With FLEXIKEY you can instantly save the bad line, recall it for editing and re-execute it. You never have to type in the same thing twice. I must confess, the idea came from my IBM PC at work, which has similar functions.

FLEXIKEY

The FLEXIKEY routine completely replaces BASIC's normal keyboard entry routine and places each entered BASIC line into a buffer when you press the ENTER key. This entry is then recallable for re-execution or modification by a set of simple commands.

The best way to describe how it works is by example. Let's say you have just typed in the command

```
COPY"OLP.PGM" TO "NEW.PGM"
```

and ENTERed it. It returned an ?NE error because you meant to type *OLD.PGM*. Instead of retyping the whole line, use the right arrow key to recall each letter from the buffer. Pressing it seven times will recall

```
COPY"OL
```

with the cursor just after the 'L'. Now type in the 'D'. This replaces the incorrect 'P'. You could get the rest of the line out by repeatedly pressing the right arrow, but if you press SHIFT/right arrow the remainder of the line appears, with the cursor at the end. If you were to press ENTER, then this line would be put into the holding buffer and executed also.

But let's say that just as you were about to press ENTER you realized that the proper program name was *VERY OLD.PGM*. You could press ENTER anyway and get another error and then edit again, but if you press SHIFT/@ the command line will be stored in the buffer without execution, ready for further editing. When you do this a '@' is displayed at the end of the line to remind you that the command was just stored and not executed.

So you do this and then press the right arrow five times to recall *COPY"*. To insert the *VERY*, press the SHIFT/up arrow. This puts you into the insert mode and each character typed will be inserted in the command line, with the remaining characters in the buffer not overwritten. The overtype mode is returned whenever you press a left, right or down arrow key. Once *VERY* is typed, the SHIFT/right arrow key will recall the remainder of the line for entry.

But once again you get an ?NE error because the name of the file was really *VERY.PGM* (will you ever get it right?). Press the right arrow key nine times until *COPY"VERY* is displayed. Now press the down arrow key three times, once for each letter in *OLD*. SHIFT/right arrow will then spit out the rest of the line which now reads

```
COPY"VERY.PGM" TO "NEW.PGM"
```

If you are editing a line and things get really scrambled, don't worry, just hit left arrow to delete the character to the left of the cursor. The original character at that position is still in the buffer and could be pulled out with right arrow. If the whole line is messed up, press SHIFT/left arrow and the whole thing will disappear. But the original line is still in the buffer so you can start all over.

Some of the arrow keys now used by FLEXIKEY previously created printable characters (square brackets, left arrow and the like). To get these now, press SHIFT/CLEAR and then the arrow key you want. The normal character will appear. To get the back slash which SHIFT/CLEAR normally produces, press SHIFT/CLEAR twice.

FLEXIKEY does not interfere with the normal operation of BASIC's *EDIT* command. It works in the command mode and also within BASIC programs when entry is via an *INPUT* command. Also, some machine language programs use BASIC's entry routine, and therefore FLEXIKEY is available for use within them also. (Computerware's MACRO assembler MAC falls into this category, for one.)

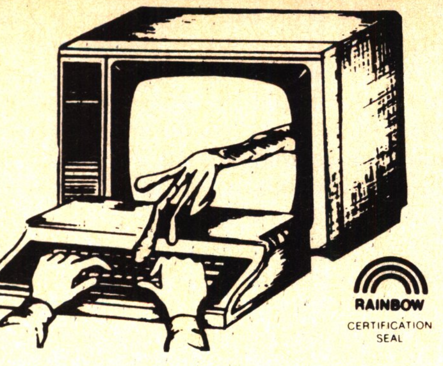
The buffer used by FLEXIKEY is the cassette buffer, so correct operation will not occur immediately after cassette input/output operations. It does not interfere with this I/O, it's just that they share a common buffer area.

As I said earlier, once you get used to remembering FLEXIKEY is there, you'll wonder how you ever managed without it.

Adding The New Functions

This is a simple process using your editor. Call in last month's listing and make the following changes using the [*REF#*] given as a locating guide. 'Uncomment' (remove the initial asterisk from) reference Line 1 and delete all lines *after* reference Line 29, as these are in this month's listing.

Type in the additional code in Listing 1 at the end of the existing code. Then reassemble the result and try it as you did last month's listing. You should find that FLEXIKEY works as described. If not then it's "hunt the typo" time, until it does.



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EDTASM+ Bug

A bug in *EDTASM+* can cause you problems. If your assembly creates *Multiply Defined Symbol* errors when you know there aren't any, then the bug bit you! It manifests itself when you use arithmetic in the operand field, and the math references a label.

For example, in the program *SYSTEM* from part one, *EDTASM+* does not like the line *CMPU #BUFFER*+256, but if you change it to *CMPU #256*+BUFFER it likes it just fine. So look for lines like this before tearing all your hair out!

A Gentle Reminder

When you have transferred BASIC (unmodified or otherwise) to a disk or an EPROM using information in this series, the result is *still copyrighted* by RS and Microsoft. Giving the disk or EPROM away or selling it to others infringes on this and is illegal.

None of my patch code contains original RS BASIC code and is itself copyrighted. However, it may be freely distributed as long as my copyright notice remains intact, both in the source code and in the start-up banner. My revisions may not be sold for profit without my written consent.

Coming Next Month

We will add the code to make many of the new BASIC commands fully functional, including *COLD* and *AUTO* and *DATE$*. So let's make it a date$!

If you would like the entire DOSPATCH *program source, along with binary files with and without the parallel port driver for* DECB *1.0 and* DECB *1.1, just send me a disk (no cassettes please) along with $6 and a stamped, addressed disk mailer. I will load the disk and return it to you promptly.*

Address this request or any questions to:
Colin Stearman, 143 Ash Street, Hopkinton, MA 01748.

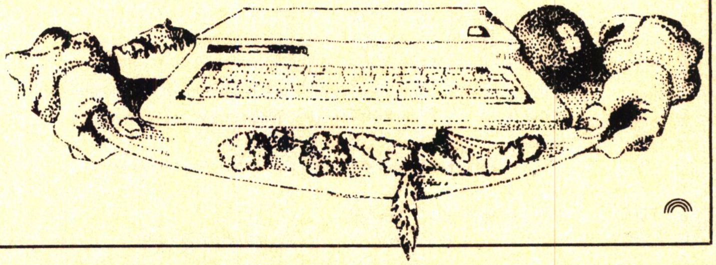
The listing:

```
0708        OPT   LIS
0709 *********************************************
0710 *  PATCH #2 to RSDOS (C)1984 Colin Stearman *
0711 *********************************************
0712 *
0713 *****************************************
0714 *              FLEXIKEY
0715 **        BASIC LAST LINE RE-ENTRY AND EDIT ROUTINE
0716 * This is not a callable command, but a set of
0717 * direct commands from the keyboard, to allow access
0718 * to the last command entered. It is designed to
0719 * work only when called from BASIC and does not
0720 * interfere with the EDIT commands.
0721
0722 *        COMMANDS ARE:
0723 *
0724 * LEFT ARROW -       output next character of old line
0725 * SHIFT/LEFT ARROW- output rest of old line
0726 * SHIFT/UP ARROW -  insert, no old line increment
0727 * DOWN ARROW -       delete next character in buffer
0728 * SHIFT/@ -          store line input so far.
0729 *                    No interpretation
```

```
                0730 *
                0731 ********************************************
                0732 * GENERAL PRINCIPLE OF OPERATION:
                0733 *
                0734 * To allow access to special keyboard entries the
                0735 * RAM hook at $16A is modified to go to this routine.
                0736 * If the device is 0, the keyboard,
                0737 * the key and cursor are obtained and output from
                0738 * here. The special keys interpreted  and characters
                0739 * are drawn from this as required. One permanent RAM
                0740 * location is used to indicate the need to initialize
                0741 * pointer.
                0742 *
                0743 * At the end the old return is removed from the stack
                0744 * so it is not taken.  This allows the input
                0745 * handling routine to handle the character as normal.
                0746 *
                0747 * Because SHIFT/UP ARROW & SHIFT/RIGHT ARROW are also
                0748 * used to create the left arrow and ], these are
                0749 * now obtained by pressing SHIFT/CLEAR first.
                0750 * As this is the backslash this can be obtained by
                0751 * pressing SHIFT/CLEAR twice.
                0752 *
                0753 * FLAGS:
                0754 * INTFLG  0 = line in BASIC buffer just stored
                0755 *        FF = line in hold buffer in use
                0756 * HLDPTR zero-based pointer into hold buffer
                0757 * INSERT  0 = Insert mode off
                0758 *        FF = Insert mode on
                0759 * WHLINE  0 = SHIFT/RIGHT ARROW not previously pressed
                0760 *        FF = SHIFT/RIGHT ARROW previously pressed
                0761 *
                0762 ************************************************
                0763 *
DA60 966F       0764 KEYBRD LDA   DEVNUM
DA62 270C       0765        BEQ   KEY         DEVICE IS KEYBOARD

---

                0766 *      SEE IF CASSETTE I/O GOING ON
DA64 81FF       0767        CMPA  #-1         CASSETTE DEVICE CODE
DA66 2605       0768        BNE   JMPOUT      NOT CASSETTE SO DO NOTHING
DA68 8601       0769        LDA   #1
DA6A B7014A     0770        STA   INTFLG      MAKE FLAG POSITIVE
DA6D 7EC58F     0771 JMPOUT JMP   CHRVCT      CONTINUE OLD CODE
                0772 ************************************************
                0773 *
DA70 3414       0774 KEY    PSHS  B,X         PRESERVE REG VALUES
DA72 AE67       0775        LDX   7,S         SEE IF CALLED FROM IDLE LOOP
DA74 8CA39D     0776        CMPX  #$A39D      IDLE LOOP CALL RETURN ADDRESS
DA77 2704       0777        BEQ   INIDLE      IN THE IDLE LOOP
DA79 3514       0778        PULS  B,X         FLAGS NOT AFFECTED
DA7B 20F0       0779        BRA   JMPOUT      IS NOT IDLE LOOP
                0780 * THIS ENTRY LINE RECALL WILL ONLY FUNCTION
                0781 * WHEN IN THE BASIC IDLE LOOP
                0782 *
DA7D 0F70       0783 INIDLE CLR   $70         FLAG BUFFER FLUSHED
DA7F 7D014A     0784        TST   INTFLG      HAVE WE BEEN HERE SINCE
                0785 *                  LAST <CR>?
DA82 270A       0786        BEQ   GETTKN      NO CLEAR THE FLAGS
                0787 * YES SEE IF CASSETTE I/O JUST DONE
DA84 2B2B       0788        BMI   TESTWH      NO SO CONTINUE
DA86 7F01DA     0789        CLR   HLDBFR      SET FIRST BYTE IN HOLD=0
DA89 7F014A     0790        CLR   INTFLG      READY FOR COMPLEMENTING
DA8C 2000       0791        BRA   GETTKN      GO CLEAR FLAGS
                0792 *
                0793 *
                0794 *      FIRST TIME THROUGH SINCE <CR> SO SET UP
DA8E 73014A     0795 GETTKN COM   INTFLG      SET FLAG TO $FF
                0796 *      CLEAR FLAGS
DA91 7F01D7     0797 RENTER CLR   HLDPTR
DA94 7F01D8     0798        CLR   INSERT
DA97 7F01D9     0799        CLR   WHLINE
                0800 *
                0801 *      READ CHARACTER FROM KEYBOARD
```

```
                0802 *
DA9A BDA1B1     0803 KYREAD JSR   GETKEY      RETURNS KEY IN A
                0804 *
                0805 *      NOW SEE WHAT WE GOT
                0806 *
DA9D 8109       0807        CMPA  #$09        RIGHT ARROW next character
DA9F 2715       0808        BEQ   GETCHR      GO DO IT
DAA1 815D       0809        CMPA  #$5D        SHIFT/RT ARROW rest of line
DAA3 2605       0810        BNE   J1          NOT THIS
DAA5 7301D9     0811        COM   WHLINE      SET WHOLE LINE FLAG
DAA8 200C       0812        BRA   GETCHR      GET NEXT BUFFER CHARACTER
DAAA 815F       0813 J1     CMPA  #$5F        SHIFT/UP ARROW insert toggle
DAAC 261F       0814        BNE   J2          NOT THIS
DAAE 7301D8     0815        COM   INSERT      TOGGLE INSERT FLAG
                0816 *
                0817 *      SEE IF SHIFT/RT ARROW PREVIOUSLY PRESSED
DAB1 7D01D9     0818 TESTWH TST   WHLINE      OUTPUT WHOLE LINE IF SET
DAB4 27E4       0819        BEQ   KYREAD      NO SO READ KEYBOARD
                0820 ******************************************
                0821 *      GET CHARACTER FROM HOLDING BUFFER
DAB6 7F01D8     0822 GETCHR CLR   INSERT      RESET INSERT FLAG
DAB9 F601D7     0823        LDB   HLDPTR      GET POINTER
DABC 8E01DA     0824        LDX   #HLDBFR     POINT X TO HOLDING BUFFER
---
DABF A685       0825        LDA   B,X         GET CHARACTER
DAC1 2605       0826        BNE   GOODCH
                0827 *      ALL BUFFER IS OUT
DAC3 7F01D9     0828        CLR   WHLINE      RESET POINTER
DAC6 20D2       0829        BRA   KYREAD      IGNORE
                0830 *      GOT GOOD CHARACTER
DAC8 7C01D7     0831 GOODCH INC   HLDPTR      MOVE PAST CHARACTER
DACB 204A       0832        BRA   EXIT        AND RETURN WITH IT
                0833 **************************
DACD 8113       0834 J2     CMPA  #$13        SHIFT/@ close line
DACF 2759       0835        BEQ   LINCLS      GO TO LINE CLOSE
DAD1 810D       0836        CMPA  #$0D        RETURN enter
DAD3 276E       0837        BEQ   ENTER
DAD5 8108       0838        CMPA  #$08        BACKSPACE delete last char
DAD7 2709       0839        BEQ   J4
DAD9 810A       0840        CMPA  #$0A        DOWN ARROW delete next char
DADB 2617       0841        BNE   J3
DADD BDDB1C     0842        JSR   INCPTR      INCREASE HOLD POINTER
DAE0 20B8       0843        BRA   KYREAD      JUMP BACK TO KEY READING
                0844 *
                0845 *      HANDLE BACKSPACE IF INSERT OFF
                0846 *      DECREASE HLDPTR
DAE2 7D01D8     0847 J4     TST   INSERT
DAE5 2625       0848        BNE   CONXIT      ON SO DON'T DECREMENT
DAE7 8D02       0849        BSR   DECPNT      CONDITIONAL DECREMENT HLDPTR
DAE9 2021       0850        BRA   CONXIT      GO TO CONDITIONAL EXIT
                0851 ******
DAEB 7D01D7     0852 DECPNT TST   HLDPTR
DAEE 2703       0853        BEQ   ATZERO      ALREADY ZERO
DAF0 7A01D7     0854        DEC   HLDPTR      REDUCE HLDPTR BY ONE
DAF3 39         0855 ATZERO RTS
                0856 ******
DAF4 8115       0857 J3     CMPA  #$15        SHIFT/BCKSP clear to start
DAF6 2711       0858        BEQ   CLRPNT      GO CLEAR HLDPTR
DAF8 810C       0859        CMPA  #$0C        CLEAR
DAFA 270D       0860        BEQ   CLRPNT      DITTO
DAFC 8103       0861        CMPA  #$03        BREAK
DAFE 2709       0862        BEQ   CLRPNT      YES SO RESET HLDPTR AND EXIT
DB00 815C       0863        CMPA  #$5C        SHIFT/CLEAR special insert
DB02 2608       0864        BNE   CONXIT      NO SO CONDITIONALLY EXIT
DB04 BDA1B1     0865        JSR   GETKEY      GET ANOTHER KEY
DB07 2003       0866        BRA   CONXIT      AND CONDITIONALLY EXIT
                0867 *********
DB09 7F01D7     0868 CLRPNT CLR   HLDPTR      CLEAR HLDPTR
                0869 *********
DB0C 8120       0870 CONXIT CMPA  #$20        CHECK FOR CONTROL CHARACTER
DB0E 2507       0871        BLO   EXIT        EXIT FROM ROUTINE
                0872 *      PRINTABLE CHARACTER SO SEE IF INSERT ON
DB10 7D01D8     0873        TST   INSERT
DB13 2602       0874        BNE   EXIT
```

```
DB15 8D05       0875        BSR   INCPTR      INCREMENT HLDPTR
DB17 3514       0876 EXIT   PULS  B,X         RECOVER INCOMING VALUES
DB19 3262       0877        LEAS  2,S         CLEAN OLD RETURN OFF
DB1B 39         0878        RTS               RETURN TO BASIC CALL
                0879 **********
DB1C 8E01DA     0880 INCPTR LDX   #HLDBFR     POINT TO HOLDING BUFFER
DB1F F601D7     0881        LDB   HLDPTR
DB22 6D85       0882        TST   B,X         GET CHARACTER IN HOLD
DB24 2703       0883        BEQ   ZEROBT      ZERO BYTE SO AT AT END
---

DB26 7C01D7     0884        INC   HLDPTR
DB29 39         0885 ZEROBT RTS
                0886 ***************************************
                0887 *      DO SHIFT/@ LINE CLOSE
DB2A 6FF801     0888 LINCLS CLR   [1,S]       ZERO OUT LAST BYTE
                0889 *      1,S IS X, THE PNTR IN THE BASIC INPUT BFR
                0890 *
DB2D 8640       0891        LDA   #'@         LOAD @ SIGN
DB2F BDA282     0892        JSR   CHROUT      OUTPUT IT
DB32 BDB958     0893        JSR   RETURN      OUTPUT CARRIAGE RETURN
DB35 C601       0894        LDB   #1          RESET BASICS CHARACTER COUNT
DB37 E7E4       0895        STB   ,S          ON STACK
DB39 8E02DD     0896        LDX   #BASBFR     ALSO BUFFER POINTER
DB3C AF61       0897        STX   1,S         ALSO ON STACK
DB3E 8D0E       0898        BSR   MOVBLK      TRANSFER INPUT BUFFER TO HOLD
DB40 7EDA91     0899        JMP   RENTER      RESET AND START OVER
                0900 ****************************************
                0901 *      DO ENTER
DB43 7F014A     0902 ENTER  CLR   INTFLG      INDICATE BASIC BUFFER CHANGED
                0903 *
                0904 *      CLEAR LAST BYTE IN BASIC INPUT BUFFER
                0905 *      FOR MOVE CODE TO DETECT IT
DB46 6FF801     0906        CLR   [1,S]
DB49 8D03       0907        BSR   MOVBLK      TRANSFER INPUT BUFFER TO HOLD
DB4B 7EDB17     0908        JMP   EXIT        AND LEAVE
                0909 ****************************************
                0910 *      COPY BASIC INPUT BUFFER TO HOLD UNTOKENIZED
DB4E 8E02DD     0911 MOVBLK LDX   #BASBFR     GET START OF BASIC BUFFER
DB51 108E01DA   0912        LDY   #HLDBFR     GET START OF HOLD BUFFER
DB55 E680       0913 DOMORE LDB   ,X+
DB57 E7A0       0914        STB   ,Y+
DB59 26FA       0915        BNE   DOMORE      NOT A ZERO BYTE YET
DB5B 39         0916        RTS
                0917 *****************************************
                0918
                0919
DB5B            0920 ZZLAST EQU   *-1         last used address value
                0921 *
                0922 * ZZLAST must not be greater than $DFFF for
                0923 * DOS 1.0 and $DEFF for DOS 1.1.   The latter
                0924 * has the OS-9 Boot program and SWI set routines
                0925 * from $DF00 to $DF4C
                0926 *
                0927 *
                0936        OPT   LIS
D991            0937        END   ADDCOM
        NO ERROR(S) DETECTED
```



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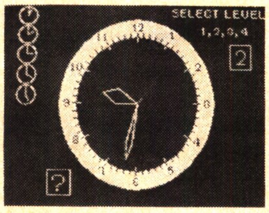

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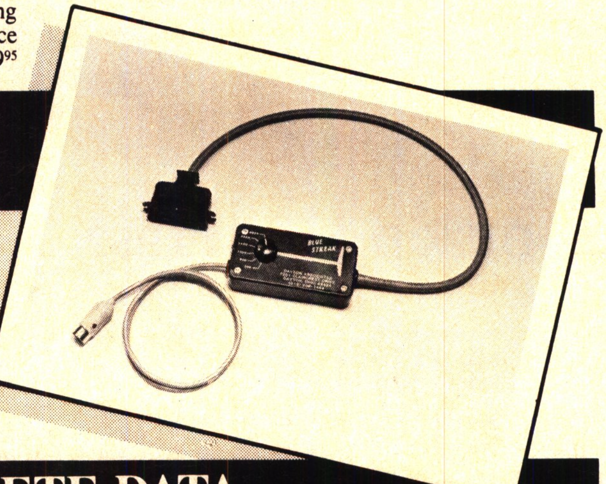

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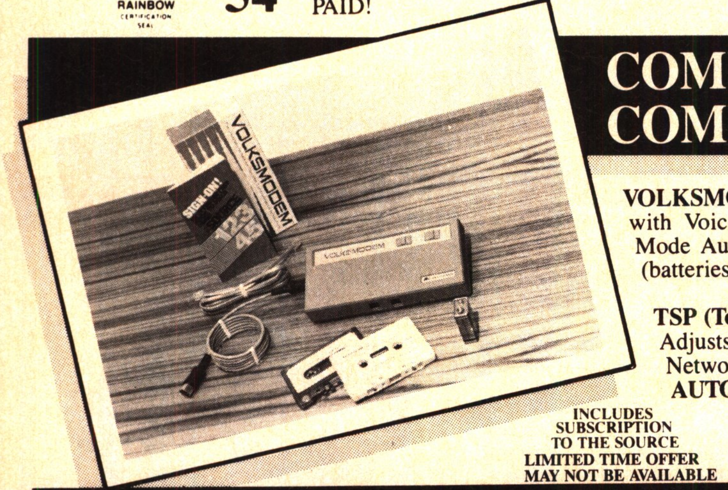

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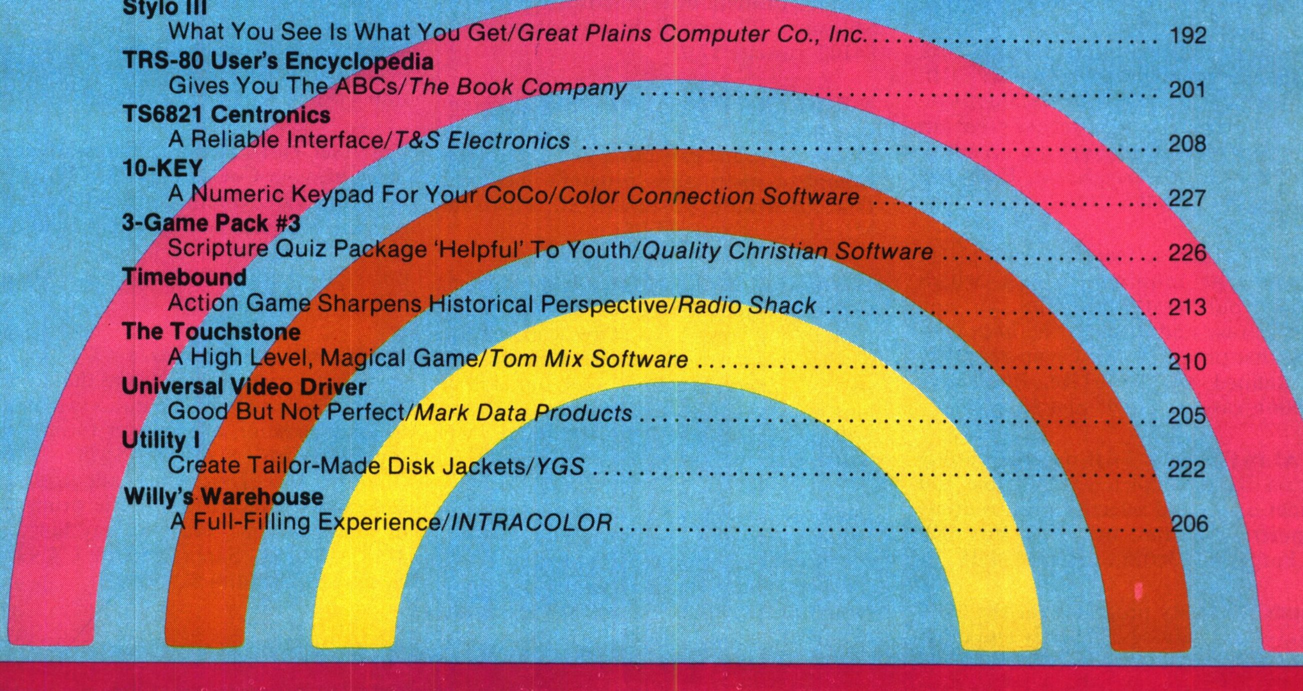

RECEIVED & CERTIFIED

The following products recently have been received by THE RAINBOW, examined by our magazine staff and approved for the *Rainbow Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purports to be. This month the *Seal of Certification* has been issued to:

TaxAid, a tax preparation program that prints the federal schedules A, B, C, E, F, G, and child and dependent care. No special forms are needed. *TaxAid* also calculates data for the Form 1040 and prints by line number, AlphaByte, 1008 Alton Circle, Florence, SC 29501, cassette $19.95, disk $24.95 plus $1.50 S/H

STOMP, a 32K ECB board game that uses one or two joysticks and/or the keyboard. Players move around the board, according to the roll of the dice, unloading a prespecified amount of chips as they go. The object of the game is to get rid of all the chips at the game's end with the easiest disposal being the stomping through opponents' positions. Cancoco Software, P.O. Box 2914, Medley, Alberta TOA 2MO, cassette, $24.95

Cassette Box Insert Maker, a program that enables the user to produce professional looking inserts for cassette hard boxes. A printer is required. Different versions are available for various system types. CoCo users can obtain a copy of the program by forwarding a blank tape or formatted disk along with a self-addressed postage-paid return mailer. (CoCo users outside the U.S. Postal Service should forward an addressed mailer and at least two International Postal Reply Coupons to cover postage.) All requests should mention program number 801A (the documentation program). Disk users should request program number 801B, Extended BASIC users 801C and Color BASIC users 801D. There is no purchase price but contributions in any amount are accepted. CoCo Freeware Clearinghouse, P.O. Box 1084, Morgantown, WV 26507

BASIC Searcher, a machine code utility program that requires 16/32K which searches your BASIC programs for any desired phrase and displays the lines containing that phrase. Color Computer Utilities Unlimited, 3907 Bethel Rd., Boothwyn, PA 19061, cassette $19.95 plus $2 S/H

DATALIST, a 32K ECB database utility program that is completely redefinable, and provides a sort and selective print routine. Computer Associates, Inc., P.O. Box 683, West Fargo, ND 58078, cassette $24.95

Textools, 17 utility programs for the OS-9 user involving catalogs, file copy and other handy functions. Computerware, P.O. Box 668, 4403 Manchester Avenue, Suite 102, Encinitas, CA 92024, disk $29.95 plus $2 S/H

SUPER GEMPRINT, is a ML program supplied on cassette tape, transferrable to disk that requires 16K ECB. It will copy the image of any Hi-Res screen (*PMODE 0, 2, 3* or *4*) to a Gemini printer. In order to fill an entire page, the image is printed sideways (starting from the left edge of the screen). Printing of the four-color modes is implemented with gray-level shading. Dayton Associates, Inc., 7201 Claircrest Bldg. C, Dayton, OH 45424, cassette $24.95, plus $2 S/H. Ohio residents include 6% sales tax.

WIZARD, a 16K to 64K utility program that offers a new character set for the *Telewriter-64* with true descenders. *WIZARD* can give visible carriage return marks at the end of text lines and is installed by modification of the program *WIZ*. Full instructions are supplied for both disk and cassette in any size system. D. Dean Rector, 2601 Bridalwood Dr. #4, Knoxville, TN 37917, cassette $16.95

3-D Maze, a 16K ECB arcade game that includes clue options and two mazes with degrees of difficulty. Success depends on your use of all the directional arrows. Draco Software, 22 Lassell St., Portland, ME 04102, cassette $7.95

E-Z Art, a 16K ECB graphics utility program that includes: basic geometric designs, paint, save on tape, and two and four color modes. Complete instruction program included. Draco Software, 22 Lassell St., Portland, ME 04102, cassette $5.95

Domes-Day, a 16K ECB arcade game which requires a joystick. You must defend the city from falling bombs that increase in number with each new wave of offense. Defense consists of a protective dome and your skill in blasting the bombs out of the sky. Draco Software, 22 Lassell St., Portland, ME 04102, Cassette $5.95

Intercept, a 16K ECB arcade game that requires a joystick. Your mission is to intercept the aliens trying to make planetfall. The quicker you are, the more points you score. Draco Software, 22 Lassell St., Portland, ME 04102, cassette $4.95

Elite*File, a 12K ML database manager that has these capabilities: up to 255 fields per record, up to 2,000 characters per record, up to 4,000 records per filename, up to 16 filenames open at the same time, sort, scan, edit and record select features, production of tabular record reports, calculator math between fields. Elite Software, P.O. Box 11224, Pittsburgh, PA 15238, disk $74.50 plus $2.50 S/H

K-BASIC Compiler, for FLEX and OS-9 users generates assembly language source code files for assembly by the assembler. It is a two stage compilation. You write a BASIC program, compile it and then assemble it to the final executable machine code form. The compiler and assembler do the rest. *OSM* is and eight-bit macro assembler. It can support structured constructs like WHILE and FOR, etc. These constructs can define macros with suitable parameters, conditional assembly directives, the ability to change the value of a label or symbol and source code may be assembled in modular form. Lloyd I/O, 19535 NE Glisan, Portland, OR 97230, both disks $199.

Easy-File, a 32K database management system which features up to 30 fields in a record, password protection, search and edit functions, tab stops, horizontal and vertical reports. Requires a printer with 80 columns or greater and at least one disk drive. Comes with complete instructions. Mark Data Products, 24001 Alicia Parkway, #207, Mission Viejo, CA 92691, disk $59.95

Universal Video Driver, a hardware device to enable your CoCo (and CoCo 2) to operate with a video monitor instead of a television set. It comes with an audio connector. No soldering required. Mark Data Products, 24001 Alicia Parkway, #207, Mission Viejo CA 92691, $29.95

Trivia and Some Significa, a 16K ECB game for two to four players or teams that capitalizes on the trivia fad. It contains two modes: *Trivia*,a question and answer format with suggested answers subject to vote on their veracity; *MakeTriv*, which allows you to add/enter questions, find, delete, print, save, or view questions. Moreton Bay Software, 316 Castillo St., Santa Barbara, CA 93101, cassette $19.95, disk $21.95

MasterFile, a 32K ECB utility program that requires at least one disk drive. This is a file management system designed to organize all programs, files, data sets. etc. The main function of *MasterFile* is cataloging disk files and it provides other peripheral functions. Sofge Enterprises, P.O. Box 309, Hilliard, FL 32046, disk $19.95

Disk Utility 2.1, a program incorporating several useful functions for disk users. Features include directory sorting, fast formatting and backups, examining files and some disk repair functions. Spectrum Projects, P.O. Box 21272, Woodhaven, NY 11421 or P.O. Box 9866, San Jose, CA 95157-0866, $24.95 plus $3 S/H

Musica 2, a 32K ECB music program that requires either a disk drive or cassette recorder and is compatible with all disk ROM versions. Features include: easy entry and editing of music, chords in four-part harmony, vibrato effect possible and waveshapes may be switched as music plays and music may be dumped to any graphics printer. Speech Systems, 38W255 Deerpath Road, Batavia, IL 60510, cassette $34.95, disk $39.95

Music Library 100, an Extended Color BASIC music program with over 100 four voice songs giving three hours of music. Among the categories included are: classical, stage, cinema, patriotic, and music from the 50s, 60s, and 70s. Speech Systems, 38W255 Deerpath Road, Batavia, IL 60510, cassette $34.95, disk $39.95

TIMSUTILITY, a 32K ECB supplement and complement to *TIMS* and *TIMSMAIL* that contains the following database utilities: 1) global change 2) global delete 3) add/delete fields in the original record 4) split file, enabling user to create new files based on range search criteria or using Boolean Logical operators 5) multi-search mode. Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068, cassette $14.95

AutoRun 64, a 16K ECB cassette utility that builds a ML loader which when combined with BASIC or your own ML programs, is self-starting and loads and starts your program. It enables 64K mode and moves ECB higher in memory, freeing an additional 8K for larger programs. Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068, cassette $24.95 plus $1 S/H

Talking Shiphunt, a 32K ECB electronic version of "Battleship" which requires a Voice Pak using the Votrax SC-01 Voice synthesizer Chip and Del Software's *Translate* program. The computer places its fleet at random and you must find the fleet before your ammunition runs out. Supplied on cassette, the program can be transferred to disk. Cobra Software, 10203 Arapahoe Road, Lafayette, CO 80026, cassette $10.95

Floppiclene, a cleaning product for your disk drive(s). It is available for 3.5-inch, 5.25-inch and 8-inch drives and comes with aerosol cleaning solution, disk jacket, 20 cleaning disks, plus two anti-static screen wipes for your monitor. Refill kits available. Automation Facilities Corp., 5740 Thornwood Drive, Goleta, CA 93117, $34.95

Counting Things, an educational mathematics program designed for ages three to eight and requiring 16K ECB. The youngster selects a target and then counts to the target. Word, numeral, a changing quantity and an abacus reflect each entry. The second program in the package presents the situation and asks for the correct total. Hi-Res graphics and upper- and lowercase letters are used. Thompson House, P.O. Box 58, Kamloops, British Columbia, Canada V2C 5K3, cassette $14.95

The Enhancer, an ML utility program requiring 64K ECB that adds nine commands and one function to Extended Color BASIC or Disk Extended BASIC. Included among the commands are: RECOVER, which will recover a program that has been erased by a *NEW* command; REPEAT, which turns on and off the keyboard repeat feature; BREAK, which enables or disables the BREAK key; HIPRINT, which controls the computer display mode; SCROLL, which controls sectional scrolling of the screen; and DESPACE, which removes all unnecessary spaces from BASIC programs. H.D.R. Software, 27 Doyle Street, St. John's, Newfoundland, Canada A1E 2N9, cassette $25 Can., disk $29 Can., postage paid

Addition, an educational math program requiring 16K ECB and designed especially for use in elementary and special education settings. The program consists of eight levels of increasing difficulty and it adjusts automatically in accordance with the student's performance. Wish Software, 242 Waterman Ave., Apt. #20, North Providence, RI 02911, cassette $24.95 plus $1 S/H

Coins, an educational package requiring 16K ECB that consists of three separate activities: Counting Coins, which requires the student to count varying numbers of pennies, nickels, dimes and quarters and enter the answer using the dollar sign and decimal format; Adding Coins, which requires the student to associate the correct coins with a given amount; and Making Change, which requires the student to subtract a cost from a given amount and then produce the correct coins for the change. Wish Software, 242 Waterman Ave., Apt. #20, North Providence, RI 02911, cassette $24.95 plus $1 S/H

Text, an educational program requiring 16K ECB and designed to help children become comfortable with typing on a video display. The letters are large and easy to read and the arrow keys are used to position the cursor for editing. Wish Software, 242 Waterman Ave., Apt. #20, North Providence, RI 02911, cassette $24.95 plus $1 S/H

Tic-Tac Math, an educational program requiring 16K ECB. The program combines the game of tic-tac-toe with math exercises. Addition, subtraction or multiplication are selected by the student, along with the level of difficulty. Wish Software, 242 Waterman Ave., Apt. #20, North Providence, RI 02911, cassette $24.95 plus $1 S/H

Pac-Panic, an ML Hi-Res graphics arcade-type game requiring 32K of RAM and at least one joystick. This "Pac" game features two screens with invisible mazes. After seven monsters are eaten, their ghosts join to form a single ghost or centipede that cannot be destroyed — only avoided. Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette $24.95, disk $27.95, plus $2 S/H

Quix, an ML Hi-Res graphics arcade-type game requiring 32K of RAM and at least one joystick. Based on the arcade game of similar name, the object is to draw boxes until you have filled in 75 percent of the screen while avoiding the Quixes and sparklers. Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette $24.95, disk $27.95, plus $2 S/H

Warehouse Mutants, an ML Hi-Res graphics arcade-type game requiring 32K of RAM and at least one joystick. Your goal is to secure the warehouse by killing the Mutants who threaten to destroy you. You can either zap them before they emerge from their crates or crush them by pushing crates on top of them. But watch out — they push crates too! Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506, cassette $24.95, disk $27.95, plus $2 S/H

The *Seal of Certification* program is open to all manufacturers of products for the TRS-80 Color Computer, the TDP-100, or the Dragon-32, regardless of whether they advertise in THE RAINBOW. By awarding a *Seal*, the magazine certifies the program *does exist*, but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW's reviewers for evaluation.

— Monica Dorth

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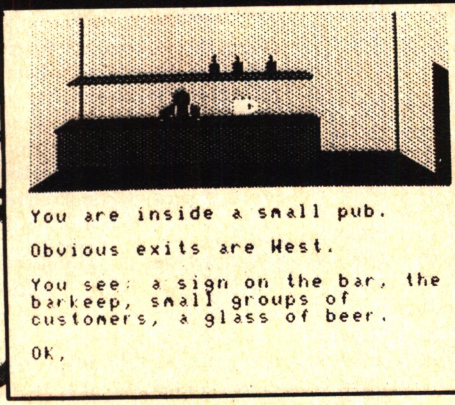
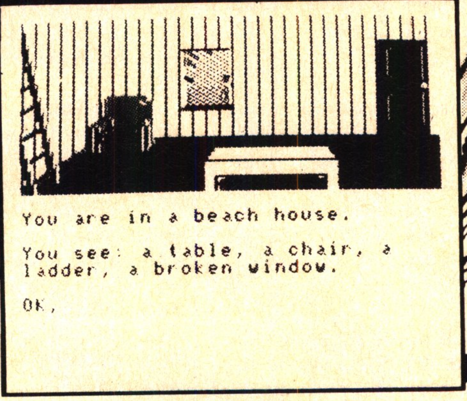


```
You are inside a small pub.

Obvious exits are West.

You see: a sign on the bar, the
barkeep, small groups of
customers, a glass of beer.

OK,
```

SHENANIGANS

Countless legends tell of a magnificent Pot of Gold hidden at the end of the rainbow. Many have attempted to find the marvelous treasure but success has eluded them and it remains hidden to this day. You, as a dedicated adventurer, have determined to search for the fabled gold and succeed where others have failed. This one is great fun! 32K required.

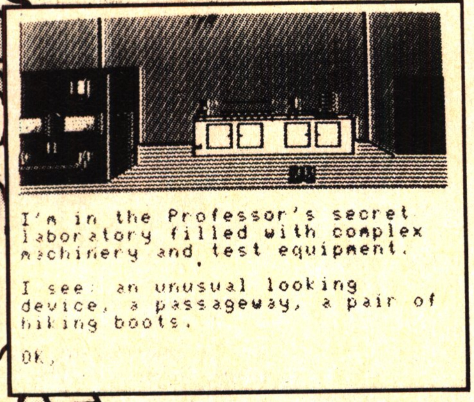


```
You are in a beach house.

You see: a table, a chair, a
ladder, a broken window.

OK,
```

SEA SEARCH

Get your shark repellant and scuba tanks ready! The graphics in this adventure are truly outstanding and the under water scenes are unforgettable. You'll run into a pirate, a mermaid and some hungry sharks in this colorful and unique treasure hunt. 32K required.

Hot CoCo—April, '84. "The fine graphics accent your imagination..."

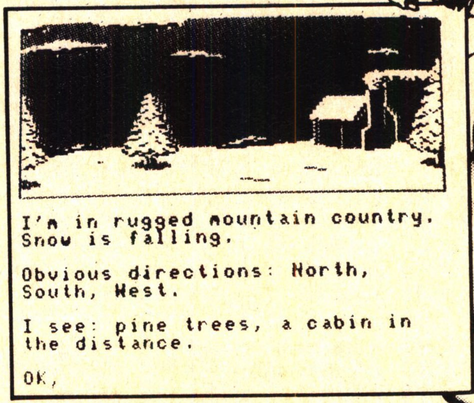


```
I'm in the Professor's secret
laboratory filled with complex
machinery and test equipment.

I see: an unusual looking
device, a passageway, a pair of
hiking boots.

OK,
```

CALIXTO ISLAND

A valuable museum treasure has been stolen, can you recover it??? This is a challenging puzzle with an occasional twist of humor. You'll visit a secret laboratory, a Mayan pyramid and you'll meet crazy Trader Jack—all in living color and exciting detail. You will really love this hi-res graphic version of the classic Calixto Island Adventure. 32K required.

Rainbow—April, '84. "It was enough to keep my wife and 8 year old son glued to the computer for an entire weekend and two week nights..."



```
I'm in rugged mountain country.
Snow is falling.

Obvious directions: North,
South, West.

I see: pine trees, a cabin in
the distance.

OK,
```

BLACK SANCTUM

Encounter the forces of black magic as you roam around an old 18th century monastery. You'll see all the evil locations in this spooky adventure, you'll love searching out and destroying the evil in this classic tale. A MUST for every adventure game fan! 32K required.

Rainbow—May, '84—"It's the graphic screens that are the shining stars..." "Some of the best I've seen."

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REVIEWING REVIEWS

SKEET

Editor:

With reference to "Letters To Rainbow," August 1983, Page 8, it is a pleasure to read that my own words were taken seriously.

Skeet requires 32K ECB, not 16K, and uses *PMODE3,* not high resolution, graphics.

Changes will be made (have been made when this is read), the structured/modular program format makes this easy to do.

The duration of the explosion will be shortened slightly. From the beginning, the high speed poke was included to reduce the time of the explosion. Although the number of CoCo's which cannot accept this feature is a very small percentage of those in use, it will be made conditional upon selection of the already existant option for high speed.

There are 13 levels, of which ten are dedicated to presenting different and increasingly difficult sets of ten keys. Only three (random keysets) will exhibit duplicate keys, and this was intentional in an effort to ensure that a typist *thinks* about the characters he/she is typing. Nonethless, I will provide a duplicate/no-duplicate option.

In summary, the review was accurate, and changes will be made. Although I cannot support her judgment call — based upon my adult and child testing (and my own bias) —she may be correct. Bear in mind that *Skeet* is not primarily a game, it is an educational program presented in a game format.

John Plaxton
Cancoco Software

10KEY

Editor:

First I would like to thank THE RAINBOW and Mr. Weaver for reviewing our new utility program, *10KEY.*

At the time *10KEY* was written and Mr. Weaver was reviewing the program, it was to be marketed by Harmonycs of Salt Lake City, Utah. Darren Croft of Color Connection Software and I have since formed a partnership. *10KEY* will now be marketed by Color Connection Software.

In his review, Mr. Weaver stated that a major problem was uncovered in the *GEN* program, which is part of the *10KEY* package.

The problem has been solved and has been incorporated into the program. I could have simply changed the instruction booklet to cure the problem. However, my philosophy is that anything that can be in the program rather than in the instructions should be! After awhile any ordinary person like myself tends to lose instructions for programs. Then, if there is some critical piece of information on using the program that needs to be remembered, the program could be rendered useless. Therefore, the *CLEAR* command that cured the problem with the *GEN* program is in the program, not in the instructions, and is transparent to the user.

I spoke to Mr. Weaver on the phone when he was reviewing the program. He had several interesting suggestions concerning *10KEY.* I have since incorporated a couple of changes. One is that the start, end and execute addresses of the *10KEY* program are displayed after the *GEN* program has generated your custom version of *10KEY.* Another is that if you choose to put your copy of the machine language *10KEY* on tape instead of disk, the program allows you to record as many as three copies without having to rerun the *GEN* program.

Again, I appreciate the work that Mr. Weaver and THE RAINBOW put into product reviews. In the unique marketing situation that third party vendors find themselves in with Radio Shack products, magazines like THE RAINBOW and product reviewers are indispensable. As Jim Reed said in his "Building August's RAINBOW," reviews can cause feast or famine for the producer of third party products. Hats off to THE RAINBOW and its fleet of reviewers for doing a fine job.

Jay R. Hoggins
Color Connection Software

THE SECTOR INSPECTOR

Editor:

When I read the review of our *Sector Inspector* by Mr. Downard (RAINBOW, August '84, Page 220), I quickly pulled a copy of our documentation to be sure that we had not left out an important function. Mr. Downard is entirely correct, the ability to read in or write to 40 tracks is a must in this type of program and we did indeed include this capability in *The Sector Inspector.* I checked the documentation and found that we had mentioned this feature, and so I must assume that our wording is vague and consider ways to improve it. We do appreciate his bringing this to our attention.

One other point which we feel obligated to correct: *The Sector Inspector's* BASIC loader will not allow the user to send linefeeds to his/her printer. I wonder if Mr. Downard was looking at the documentation for EDT (our assembly language editor — which has an expanded list of user pre-setable parameters) when he was making his review notes.

We had hoped that your reviewer would mention *The Sector Inspector's* ability to read in and edit 212 sectors at a time (as opposed to one at a time with some others), copy files or programs from disk to disk with ease even between drives, load a program from the menu for examination or edit, name a disk when copying the directory, or its ability to help the machine language programmer search for a hexadecimal (or ASCII) string and then edit it to allow testing without reassembling a text file; but we're not complaining! We found Mr. Downard's review to be entirely adequate. And we appreciate his effort.

In closing, we congratulate you on a fine publication and a rare forum for product review and "reviewing reviews."

John Erickson
Sonburst Software

SUBTRACTION DRILL

Editor:

After reading Mr. Burnette's comments, I must agree the review was "incomplete" and should have explained in greater detail some of the statements I made. I have tried several programs of this type, and *Subtraction Drill* was dry, dull, and very unlikely to generate a lot of interest with a child using it.

My three school-aged children assisted me in the review. The concept of using a computer for a training or drill program, is by no means an easy task, however, it requires a great deal of creativity, something I saw missing from this software. The author must generate material that will make a child want to keep coming back for more drills, not only a tool to be used by a teacher — typical of a teacher or parent telling the student do/try a few practice probelms. There are 13 drill routines and with a few different levels of drill — not 13 levels of instruction. The "rewards" and graphics are an integral part of the software, so much so that the return to the program subsequent use and popularity depends on it.

Selection of music is not easy, but some music can be uninspiring, or inappropriate. How can *The Star Spangled Banner,* written and devoted to a time of American conflict, be compared to getting a subtraction problem correct? And for the song *America,* written to praise our country, how can this compare to a correct subtraction problem? My daughter is in the fourth grade, and is dyslexic. Dyslexic children experience difficulty in mastering math skills. Her difficulty, together with the program's slow speed, uninspiring music and graphics, diminished her interest. Perhaps this type of student was overlooked in planning this program.

A "plastic card" with instruction was suggested because the "drill screen" is not "user friendly," and the menu screen access could be forgotten. Also the enclosed instruction sheet is not written in a level of English for the *young* user. Even I was stumped and had to think twice about what "s. bar" meant in the instructions.

The software could be used for school use, but the cost and content would not be a good buy for home use.

Stephan A. Brown
Poughkeepsie, NY

Stylo III For OS-9 — What You See Is What You Get

By Dale L. Puckett

When I first started writing, my only word processor was an IBM Selectric I. It was 1966 and we published a 32- to 40-page newspaper for recruits and permanent personnel at the Coast Guard Training Center in Cape May, N.J.

Since we wanted to put out a professonal looking product, we needed to justify all the copy in the magazine. What a process! First, we wrote the story. That's one pass through the Selectric. Then, we rewrote it. That's two passes — or maybe more.

Finally, after the lieutenant approved the copy, we typed the copy a third time. This time we filled each line with X's. The pass looked something like this.

```
   Finally, after the LieutenantXX
approved the copy, we typed theXXX
copy a third time.  This time weXX
```

Then, we went back and made one mark in a space between words for each one of the X's that appeared on the line. After doing this we typed the copy again, adding an extra space each time we came upon an X. The final copy came out looking like this — assuming we didn't hit any of the wrong keys.

```
   Finally,   after   the Lieutenant
approved the   copy,   we   typed the
copy   a third time.   This time   we
```

We've come a long way. Now with *Stylo III* you simply type, ".ju" in the first column of the first line of your text and the magic of justification will take place before your eyes. And, this is only one of many features you'll find in *Stylo III*. Let's look at the additions to this third generation writing tool first.

Stylo III Features A New Overwrite Mode

Many of my complaints with earlier versions of *Stylo* have been resolved. For example, with *Stylo II* it was a real hassle when you wanted to type over a word. You had to strike the 'I' key and then hit the letter you wanted. Now you have a continuous overwrite mode. You simply move your cursor to the beginning of the word you want to type over, strike the 'I' key and start typing. You can now type in this mode as long as you want.

There is a problem with the overwrite mode when you get to the end of your existing text. In the copy I reviewed, if you type past the last character, it is possible to send the program and crash the system. However, I mentioned this problem to the people at Great Plains Computer and they identified the cause immediately and promised to have the problem fixed before this review is ever published.

A Word Tab Key Speeds Editing

Another problem with earlier versions was the fact that you could only move the cursor along a line one character at a time. Now, you can use two additional keys to move your cursor a word at a time in either direction. This is a great improvement that makes a lot of sense because it makes the computer work like a writer — editing words.

Before *Stylo III* you had to be content with an even left margin on both odd and even numbered pages — unless you wanted to manually change the left margin each time you entered a new page. Now, you can tell *Stylo III* to print each even numbered page — they usually appear on the left-hand side of a book — with a 10-character left margin and each odd numbered page with a 15-character margin. This means that the copy on the odd numbered page will not be half buried in the gutter created by the staples that hold it together.

The Tab Key Is Now Where It Belongs

The old *Stylo* Tab key used to drive me crazy, too. Everyone who types, automatically hits the key marked "TAB" when they want to move the cursor across a line, don't they? Everyone but the early *Stylo* users it seems. Back in the "old guard" you had to hold down the control key and strike the "T" key. "T" for tab, get it? This insanity has been cured and you can now hit the "TAB" key to your heart's content.

It is now easy to set Tab stops. The people at Great Plains have added a ruler command. For example:

```
,ru 60,0,5,10,15,50
```

This line, typed with the comma in column one of a *Stylo* document would give you a line width of 60 characters. Additionally, the first character would be printed in the first column on your printer — the zero tells *Stylo* that you want an indent of zero spaces from the left margin — and you would have Tab stops set five, 10, 15 and 50 spaces from the left margin. Now, that's easy. And, better yet, you can change your formatting on the fly by simply inserting a new ruler line anywhere in your document.

A Programmers Mode Has Been Added

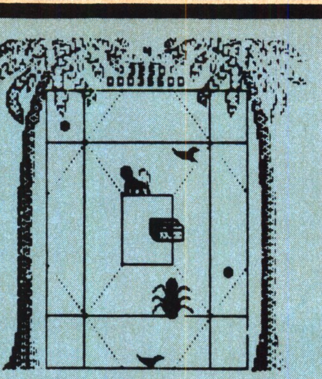
Several years ago you couldn't find too many programmers who used *Stylo* to edit their source files. This, too, will change with *Stylo III*. *Stylo* now has a "Programmers Mode."

When you get ready to edit the source code of a program written in a structured language like PASCAL or BASIC09, you simply hold down the CLEAR Key — remember that's how you get a control character with CoCo OS-9 — and strike the 'E'. Then, as you type your program *Stylo* will return the cursor to the latest Tab used each time you type "RETURN." When you have finished typing at a specific level of indentation, you get back to the first column by typing "RETURN" twice. Typing "Control E" again gets you out of the "Programmers Mode."

Great Plains has fixed *Styfix*. Older versions tended to be confusing and overbearing. The new *Styfix* utility is a snap.

Styfix lets you set up *Stylo* to work with almost any terminal or printer you can afford. It also lets you tell *Stylo* the characteristics of the terminal used by each user on a multi-user system. If you are only using *Stylo* on the CoCo, you won't need *Styfix* because Great Plains has already set *Stylo* up to work when you load it off the disk.

Stylo III features its own built-in Hi-Res screen driver for Color Computer OS-9. This will save you the cost of buying another. It also will free up some memory, giving you a larger work space for your text files.



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100% machine language fast action game. As a soldier monkey you must save the forest of Ledonia from the evil mammoth spiders, avoid the falling coconuts, save the sacred birds and recover Ledonia's treasure. Megamunk has 11 different screens with multiple colors and "four voice" music. A REAL challenge (Joystick required).

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16K $17.95

A numeric keypad for your COCO for only $17.95? Impossible? 10KEY is 100% position independent machine language software that turns a portion of your keyboard into a numeric keypad. 10KEY is useful when typing in those long DATA statements with lots of numbers or when entering numeric data with any BASIC program. (Note 10KEY does not function with INKEY$ statements) The 10KEY package contains the following 1-10KEY a machine language program that loads at the top of 16K. 2-GEN a program to generate your own custom version of 10KEY. 3-DEMO a simple graphing program with which to practice with the 10KEY program.

MATCH & SPELL turns spelling drudgery into spelling fun.
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MATHWAR is a 1st and 2nd grade math drill game.
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QUIZ ALL. A versatile quiz program. Has study and test formats and allows printing of quiz. Even includes an option for CoCo to generate multiple choice answers.
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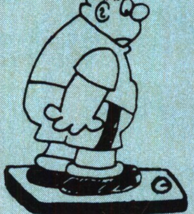
16K Disk $20.95

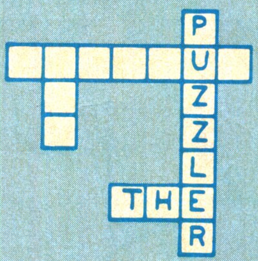
AMORTIZATION. This is the most complete, most versatile amortization program available for the CoCo.
16K Extended Basic . . $11.95

NEW



DIET-AID will help you track your calorie intake, tell you how many calories you need to maintain your weight & suggest how much exercise you need to burn up any extra calories you've consumed.
32K Cassette $19.95

NEW



THE PUZZLER will create crossword puzzles, wordsearch puzzles and wordscramble puzzles. Will print the puzzle with any dot addressable printer (printer optional). 100% machine language. Incredible!
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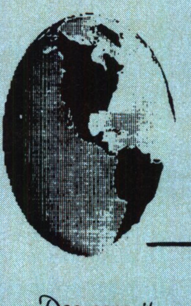

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Eight bit screen dump from CoCo to an OKidata 82A printer without dot addressable graphics! 100% machine language. Includes hints on printing pictures of Hi-res game screens.
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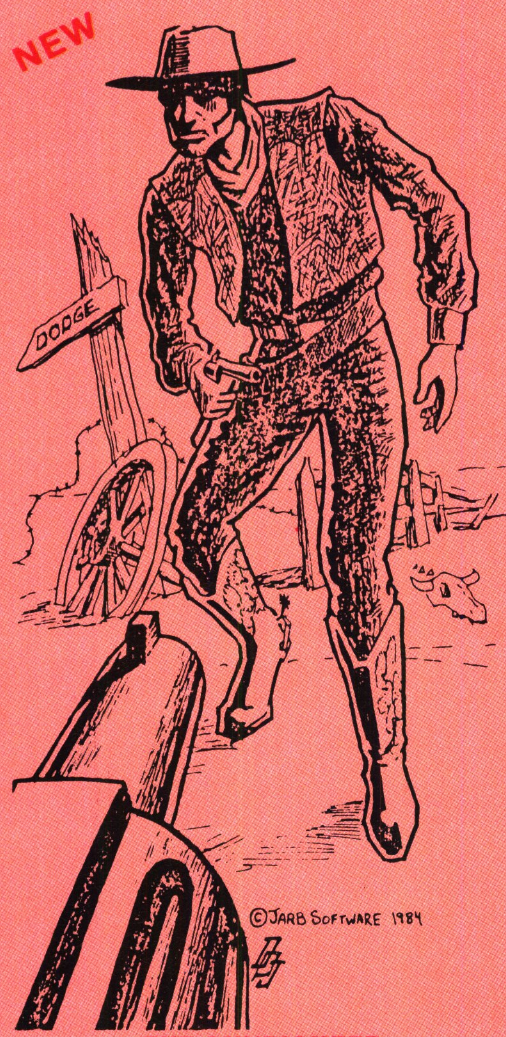
NOT FOR CoCo 2



THE GUNFIGHTER

BY Terry A. Steen

An excellent hi-res, arcade quality game program for two players. Joysticks and 32K are required in this all machine language program.

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Standard Features

We live in a strange world today. Millions of letters, reports and books have been written with word processors that took two passes to complete the job. You edited your copy with an editor. Then, you processed your prose with a text processor as you sent it to the printer.

Today, we're spoiled and you can't convince any of the "consumers" who buy IBM PCs that a word processor works unless it shows them exactly what they are going to see on the printed page on the screen while they are typing it. *Stylo* is the only word processor that brings this feature to the Color Computer. Others feature screen editing, but they do the final text processing while you print.

The problem with processing your text while you print it is that you do not know where the page breaks are going to fall. Often, this leaves you with widows or orphans — terms printers use to define one line of text left stranded on the bottom or top of a page. With *Stylo* you'll spot these problems as you enter your text and correct them by forcing a page break or shortening a sentence, etc., before you print your document. If you are a perfectionist, this feature can save you a lot of time.

The easy way to use *Stylo* with the Color Computer is to leave it set up for its default screen width of 51 characters. This will let you edit your copy without being bothered by a lot of horizontal scrolling. Then, when you have finished your writing and editing, you can set the line width of your final document by using the *",ll"* command at the beginning of your text. At this point you can scroll through the copy and make sure all the margins appear the way you want them and check the page breaks to make sure everything is going to print the way you want it to. Once you're satisfied you simply move to *Stylo's* main menu, move the cursor to PRINT and type ENTER. It's a piece of cake.

How *Stylo III* Works

Stylo III has three operating modes. You enter the first, a "Supervisor" or command mode by typing:

```
OS9: Stylo <CR>
OS9: Stylo myfile <CR>
```

As soon as you type the Carriage Return (ENTER), OS-9 will load *Stylo* and within a few seconds the main menu will appear on a Hi-Res screen. It looks like this:

```
EDIT----------------- go edit text
PRINT --------------- print the text
SAVE/RETURN -- save text and return to DOS
SAVE ---------------- save all text
SAVE TO MARK -- save text from cursor to marker
RETURN ----------- return to disk operating system
LOAD --------------- insert a file at cursor
ERASE -------------- erase present text
SPECIAL ----------- use a specialty printer
TTY ------------------ use a TTY printer
PASS ----------------- pass command to DOS
SPOOL -------------- output text for later printing
WHEEL ------------- change proportional print wheel
NEW ----------------- text from input file
```

Stylograph Word Processing System V3.0 (c) 1984

When you see this menu, you simply move the pointer up by typing the 'I' key or down by typing the comma key until you have selected the function you want. Then, type ENTER. That's all there is to it. If you need more information, *Stylo* will ask you for it with prompts at the top of the screen.

Usually, you'll want to begin typing a new document or editing an old one as soon as you bring *Stylo* to life. Because of this, *Stylo* comes up with the pointer in front of the word EDIT and you merely have to hit ENTER to go to work.

After you type ENTER, you'll be in the ESCAPE mode. To begin inserting text you hit the semicolon, which takes you into the INSERT mode where you can begin typing. After you have typed for a while and want to look back through the text, you simply type the ESCAPE key which will take you to *Stylo*'s ESCAPE mode.

The ESCAPE mode is used to move around in your document. Once in this mode you use a group of keys shaped like a diamond to move the cursor. If you are a touch typist, you know that your middle finger rests on the 'K.' Strike this key and the cursor will jump back and forth from one end of the line to the other.

Hit the 'J' key and the cursor will move one position to the left. Hit the 'L' key and the cursor moves to the right. If you want to move one line up, you move your middle finger up and strike the 'I'. To move down, you move your middle finger down and type a comma. Around this diamond are keys you reach with your index and ring fingers to scroll through your document.

Reach up with your index finger and strike the 'U' and you'll see all text on the screen move up one line. Reach down with the same finger to the 'M' and you'll see the entire screen scroll down.

If you really like to move, reach up and strike the 'O' with your ring finger to scroll up a full page. Or, move the same finger down to the period to scroll down a page at a time. With just a little practice, you're touch typing your way around your document.

The keys reached by your left hand are mnemonic in nature. You hold down the "Control" key and strike the 'D' to delete a character, type "Control A" to get assistance from the help menus, "Control W" to delete a word, etc.

Moving Things Around

Stylo gives you several commands that operate on blocks of text. Mark a block by putting two of the squiggly braces at the end of the block. Then, move the cursor to the beginning of the block. At this point you can copy the block, move it, save it to a disk file, or delete it.

Global Search and Replace functions are also built into this full feature word processor. Type an 'F' for "find" while in the ESCAPE mode and *Stylo* will ask you to type the string you are searching for. Naturally, if you wanted to do a replace, you simply type 'R' for "replace from the same mode."

Formatting

You tell *Stylo* how you want to format your text by typing special formatting commands that begin with a comma in the first column of any line. You are free to change the format of your document on the fly as you enter your text. Here are some of the major formatting commands available with *Stylo*:

```
, pl   n  set page length to n lines
, pg      begin new page
, pn   n  set page number to n
, tf      send form feed to printer
, hd      define header
, ft      define footer
, ,       end header or footer definition
, sp   n  space n lines while printing
, ss   n  set spacing to n spaces per line while printing
```

The best in software for kids!

MATH

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MULTIPLICATION TUTOR	**$14.95**
FACTORS TUTOR	**$19.95**
FRACTIONS TUTOR (Addition)	**$19.95**
FRACTIONS TUTOR (Subtraction)	**$19.95**
FRACTIONS TUTOR (Multiplication)	**$19.95**
Any 2 FRACTIONS programs	**$29.95**

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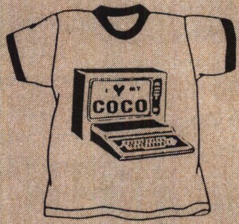

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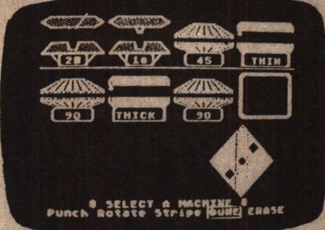

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, vt	n	vertical tab to nth line
, vs	n	set vertical spacing to n lines/inch
, nl	n	insure n lines left on current page
, ce	n	center n lines
, rj	n	right justify n lines
, ju		justify text
, nj		don't justify text
, ll	n	set line length to n
, n	n	indent n spaces
, si	n	indent one line n spaces
, lm	n	set left margin to n spaces
, cs	n	set character spacing for printer
, ps		start proportional spacing
, nps		use normal, or non-proportional spacing
, pp		start a new paragraph

When you reach the end of a page, you'll see the footer for the old page and the header for the new page appear on your screen in the proper place. This is a nice feature.

Additional Printing Controls

Stylo also accepts several control keys while you are inserting text to let you request special printing. For example, you can type "Control B" — remember that's CLEAR 'B' on CoCo — to make a word appear in Boldface. Likewise you can use CLEAR 'U' to underline a word. These commands work perfectly on my Epson MX-80 right out of the package. If you have a new printer with a lot of functions, you can configure *Stylo* to recognize four additional sequences after setting them up with *Styfix*.

You can print a document directly from *Stylo* without saving it to a disk file. This is a handy plus for those short letters you need to send out, but don't need to save.

The major disadvantage of *Stylo* when it comes to printing is the fact that you can only print or spool the text that is in memory at the time of printing. This means that you must use the accompanying *Mail Merge* package when you want to print a long document continuously. From an ease of use standpoint, it is much easier to work with shorter documents and print them with the *Mail Merge* package than it is to work with a giant document. However, from a cost standpoint, it means you must also buy the $75 *Mail Merge* package.

This review would not be complete without mentioning that Great Plains has also married *Stylograph* to the *Word-Pak* from PBJ. Running *Stylo* with this 80-column card makes all the difference in the world. You'll feel like you're working with a dedicated word processor. The combination is highly recommended.

Ease Of Use

Perhaps *Stylo*'s ease of use can best be described by a sea story. *Stylo* was available first on the FLEX operating system. OS-9 did not exist. With FLEX, only one person could work on the same computer at the same time. With a teenaged daughter taking journalism and enriched English courses every year, we had a problem.

Then came OS-9. I started to use another word processor so that both of us could work at the same time. It made a lot of sense to me. It didn't make sense to her. She thought the other word processor was too hard to learn. She had taught herself *Stylo* in those early years and would rather fight than switch.

(Great Plains Computer Co., Inc., P.O. Box 916, Idaho Falls, ID 83402)

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AMT: A Well-Documented Amortization Program

Have you ever wondered how much interest you are paying on a loan, or have you ever wondered how much of a loan you could afford without going too deeply into debt? Are you looking for a new house in the $600 a month bracket but are not sure what you can get for that kind of payment? Then do yourself a favor and read on. If you answered yes to any of the above questions, then THE OTHER GUY'S SOFTware has a program for you called *AMT (Automatic Money Tracer).*

THE OTHER GUY'S SOFTware is a somewhat new establishment in the Color Computer field, but don't let that fool you. *AMT* is one of their first programs and as long as they keep making such quality software available, I think we can look forward to seeing a lot more fine software being offered by them.

AMT is an amortization program for the 16K Color Computer with a full-featured amortization schedule.

The people at THE OTHER GUY'S SOFTware deserve a big hand for the outstanding documentation included with the program. The documentation is very clearly written and includes step by step instructions on how to use the program to its fullest, along with detailed examples to follow.

AMT can be backed up, but cannot be executed, meaning you can backup the program on a standard formatted disk and store it in a safe place. If for some reason you are not able to load your original copy, you can then rebuild the backed-up copy onto the original disk (as long as the original disk is not damaged). However, if someone tried to use the original disk as a doormat or the baby wanted to see what flavor a diskette is and it is damaged, then you can send the original disk, along with $3 plus $1.50 for shipping and handling for a replacement disk. Now, what could be easier than that?

After loading *AMT* you will be greeted with a menu consisting of:

1) Compute payment required
2) Compute number of payments
3) Compute rate of interest
4) Compute amount to be borrowed
5) Print amortization schedule
6) Set printer Baud rate
7) Quit calculating

Option 1 will compute the payment required to purchase an item on credit or to open a new loan account. An example would be as follows:

Amount Of Loan	5001.10
Interest Rate	18.650%
Number Of Years	5
Payments Per Year	12
Payment Number Of Balloon?	0

The result is $128.77 per month.

Option 2 is for calculating the number of payments needed to pay off a loan. By following the prompts and entering the required information (a total of four entries), the computer will tell you in months and years how long it will take to pay off a loan.

Option 3 will calculate the rate of interest on a loan. This is helpful in figuring what you are paying in interest on a total loan balance.

Option 4 will calculate loan payments to fit into the borrower's budget. If you want to buy a new car or a new house, you can input the monthly payment that will fit your budget and the computer will tell you what price bracket you should shop for. (If you are like me, you probably start high, then work down).

Option 5 is for printing the amortization schedule. The user is given the choice of viewing the schedule on the screen or dumping it to a printer. If you choose the screen, the schedule will be printed showing the payment number, interest total, principal total and the balance, giving you a total breakdown of all monthly payments. If a hardcopy is chosen, you will be prompted for a title so you will know what the listing is for future use; example: car payment. This is where the program really shows off. Not only does it list a total breakdown of all monthly payments but it breaks them down into fine detail such as number of payment, principal, balance, interest to date, principal to date and payment total to date. Normally about the only people to see this much information at one time are those at the bank or the loan company that is holding the account, but now it is available to everybody.

AMT will also calculate balloon accounts and negative amortization, which adds another big plus to the entire program.

I feel *AMT* is a must and could be an invaluable tool to real estate brokers, loan officers and individuals who would like to keep detailed track of loans and investment dollars.

(THE OTHER GUY'S SOFTware, 875 South Main, Logan, UT 84321, $29.95)

— Bob Brown

Hint . . .

Video Animation

If you are using your CoCo and a video cassette recorder to make tapes of your graphics, here's a way to let your computer control the recorder.

Most VCRs, both Beta and VHS units, have a jack for a remote pause control. If your recorder has a single round jack marked "pause," "remote pause" or "camera pause," usually placed near the video and audio jacks, this trick will work. The "camera pause" jack, if any, should be used instead of the "remote" jack.

Simply plug the smaller gray plug from the CoCo's cassette cable into the pause control jack. You may need a submini jack-to-mini plug adapter (like Radio Shack's 274-328) to match the plug to your VCR's jack.

When you want the VCR to pause (for example, while you draw another frame), simply insert *MOTOR ON* in your program; when you want to start recording again, simply do *MOTOR OFF.* (This is exactly the reverse of the way it works with an audio recorder.)

Be sure that the recorder isn't left in the pause mode for more than a few minutes, to prevent damage to the tape or heads. Many recorders are designed to stop automatically after a few minutes in pause.

King 'Author' Tutors Kids In Language Skills

Reading and writing are important life skills and *King Author's Tales* is a program designed to help children improve in these two areas. It lets kids create and save original stories on files, create and save optional questions and answers for each story page, create a title page picture, and print both the story and related questions.

The program comes on disk or tape for 16K or 32K with Extended BASIC. It is designed mainly as a creative writing tool, but is not a word processor. Mastering the commands of this well-written, menu-driven program is so easy that the accompanying written directions are almost unnecessary. Most options are self-explanatory.

One option in the menu allows the drawing of a title page picture for each story. Drawing is done in *SET, RESET* graphics on the text screen using the arrow keys. The directions are easy to follow but drawing in this mode can be awkward. Everything must be done in blocks. There can be no curves or circles. The picture produced is rather crude compared to ones done in Hi-Res graphics. Once completed, the picture can then be saved to disk or cassette.

When writing an original story, the user first types in a title. The program then switches to page one and the story typing begins. Each page contains dotted lines signifying available space and the directions remind the user not to type beyond the dotted green area. The directions also instruct the user to avoid breaking up words at the end of lines. This creates a more pleasing appearance. The finished page may be corrected only by wiping out the entire page and starting over. If the page is correct as it stands, the program next permits writing an optional question. Questions usually pertain to the text currently on the screen. The writer supplies the answer. Pressing ENTER moves the program on to the next page. With 16K of memory, eight pages of text are available and with 32/64K, 15 pages.

Type END as the last page of text to signal completion of the story. Then either save, erase, or review the story. As before, to make a change, the entire page on which the change occurs must be retyped. The letters on the screen appear just as they do in BASIC, all capitals, or capitals appearing on a reverse background to signify lowercase.

Another menu option loads in a previously saved file —either a title page picture or a story. The user must remember which the file name designates, a picture or a story. When a story is read in, it is displayed one page at a time. Pushing ENTER displays the question, which appears near the bottom of the screen. Space is provided below the question for insertion of the answer from the keyboard. The computer beeps if the answer is correct. If incorrect, it signals with a lower tone and displays the correct response.

Stories may also be sent to the printer. With this option the story is printed in its entirety first, followed by all the questions.

The approach taken by the author of this program is a good one. The title page drawings are somewhat stilted but they are colorful and do add interest. The two stories included in the program to get the beginner started, demonstrate good question writing techniques and are worth studying for ideas.

The strength of this program lies in its ability to test reading comprehension. With the on-screen option, the questions are written so that the text containing the answer appears on the same screen as the question. This keeps a student's attention focused on the relevant text. With the printer option, the questions may be placed in any order. Mixing up the question order permits testing total comprehension, and it avoids letting the sequence of the questions reveal clues to the location of the answers.

The writing segment of the program is its weaker feature. It is a chore to split words, add spaces, or omit spaces in order for the text to appear with an even left margin. Sometimes it would be easier to write or print the story in long hand. Having to retype an entire page to correct one mistake is tedious, especially since children are not usually accomplished typists. Inclusion of just a few of the basic editing features found in word processors would make this program really terrific.

(Computer Island, 227 Hampton Green, Staten Island, NY 10312, Extended BASIC, 16K tape or 32K disk, $29.95)

— Marty Sheldon

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The TRS-80 User's Encyclopedia Gives You The ABCs

By David Finkel

It's very gratifying to see "mainstream" software and book publishers finally giving the Color Computer the attention it deserves. The Book Company, publisher of encyclopedias for most popular brands of microcomputers, has just released a version for the CoCo and the MC-10: *The TRS-80 User's Encyclopedia (Color Computer and MC-10)*, by Gray Phillips and Guier S. Wright III. And while it has some shortcomings, it is a useful and worthwhile book, especially for the beginning to intermediate Color Computer user.

This encyclopedia has almost 250 large-size pages, and the entries are arranged alphabetically. The entries fall mainly into three categories: general computer terms, Color Computer BASIC and assembly language instructions, and product descriptions.

The articles on general computer terms cover the areas you'd expect: RAM and ROM, parallel and serial I/O, and so forth. The entries give a brief description of the term, and in some cases discuss the term in relation to the Color Computer.

The articles on Color Computer BASIC are probably the ones you'll find most useful. Each BASIC instruction is first identified as Color, Extended Color, Disk, or MC-10 BASIC. The overall purpose of the instruction is described in general, and then in great detail, often going far beyond the information presented in the Radio Shack manuals. For example, the article on the graphics instruction *GET* gives a much more efficient formula for the array size needed than the Radio Shack manual does. The *Encyclopedia* describes the undocumented edit commands 'K', 'Q' and 'A', which you may have read about in THE RAINBOW. Also, the *DLOAD* command, not described in the manuals at all, is completely explained here. There are many more examples of very informative articles on Color Computer BASIC, and these articles alone might convince you to buy the *Encyclopedia*.

Most of the BASIC articles end with a section on "pitfalls," describing common errors and how to avoid them. For example, the article on *FOR . . . NEXT* reminds you never to use a *GOTO* to jump into the middle of a *FOR . . . NEXT* loop.

The assembly language articles aren't nearly so informative. They're mainly two or three sentence descriptions of the instruction. These articles certainly aren't detailed enough to teach you how to use assembly language, but they would help you remember the details of an instruction. By the way, the assembly language articles are just for the Color Computer, not the MC-10, and there is no information on assembly language graphics.

In addition to the articles on the individual instructions, there are also useful articles summarizing all the BASIC and assembly language instructions.

The third type of article describes products available for the Color Computer and the MC-10. There's lots here: games, business software, printers, disk drive systems, and everything in between. There are survey articles listing all the products in a given category, like all the word processors, and then articles about each specific product. The product entries are usually quite brief, identifying the product, listing its major features, and giving the name of the manufacturer. The coverage is extensive, although there are some omissions: there's no mention of the Radio Shack LOGO program, for example, a very important software package. While no attempt is made to review these products, the authors have certainly performed a useful service by bringing all these product descriptions together in one place.

It's inevitable that any work of this scope will contain some mistakes, especially in its first edition. I trust they'll be corrected in the next edition.

In several places, the edit commands are mis-stated. Pressing a character does not advance the cursor to the first occurrence of that character; you have to use the command 'S' first. The entry on *SKIPF* is also wrong; you do not get an I/O Error if the program you named is not on the tape. The sound article is also in error; program execution stops until the sound is completed.

A very unfortunate error occurs in the article on FORTRAN; the sample FORTRAN program given is actually in BASIC! There's also a typographical error in the article on random numbers; *RND(-TIME)* should be *RND(-TIMER)*. Finally, a number of *LPRINTS* have slipped in instead of the Color Computer's *PRINT#-2*. All in all, it's not too long a list of errors.

One question you might have: Does the *Encyclopedia* have a lot of inside information on the Color Computer, the sort of things you couldn't learn by reading the manuals that came with the computer? The answer is yes and no. As I've mentioned, many of the entries on BASIC instructions go far beyond the information in the manuals. There are some of those "secret" *PEEKs* and *POKEs*, too, like instructions for merging programs from cassette, and *POKEs* to accomplish the "impossible" *PCLEAR0*. There are also useful tables showing how to change the Color Computer's Baud rate, how to produce different notes and tempos with *SOUND*, and a list of Color Computer error messages and their meanings. There's also a very good list of Color Computer users groups, and a list of magazines supporting the Color Computer.

On the other hand, some information that would be very useful isn't included. For example, the high speed *POKEs* aren't mentioned, and there's no discussion of how to use 64K or how to use the machine language routines in the BASIC ROM. A detailed memory map, and a list of Color Computer oriented bulletin boards would also have been very helpful.

Most of the articles are very informative. However, some are highly repetitious and really waste space. For example, I found the instructions for producing a blank line on a printer in at least 10 places. And several articles are repeated in their entirety under different headings, like instructions for hooking up a tape player under "cassette tape" and "tape cassette." Surely a cross reference would have been sufficient.

The Book Company has produced a high quality book for the Color Computer. While there are certainly some flaws, on the whole it is a worthwhile effort that deserves your consideration.

(The Book Company, 11223 South Hindy Ave., Los Angeles, CA 90045, $14.95)

The Adventurer's Handbook — A Journey Into Imagination

Have you ever daydreamed about traveling twisting mountain trails armed with a shield in one hand and a mighty sword in the other searching for the ever-elusive dragon folk? Perhaps you would prefer to journey into dark, dimly lit passages beneath ancient forgotten castles or maybe become a modern day spy, *a la* 007. If so, you may be on the verge of becoming one of the legion of role-playing Adventurers currently journeying into the limitless realm of the imagination.

If you ever thought it might be interesting but were stopped cold or confused by the awesome complexity of the standard rulebooks, then (RAINBOW columnist) Bob Albrecht and Greg Stafford's latest book may be the answer to your prayers. *The Adventurer's Handbook, A Guide To Role-Playing Games* contains, as the old saying goes, everything you always wanted to know but were afraid to ask.

First, I must mention, lest you be misled, that this book is not directly computer related. *The Adventurer's Handbook* will help you decide whether role-playing games are your cup-of-tea and, if so, how to go about getting started. The book is made up of two distinct parts. Part 1 is titled "How To Play" and provides the introduction into role-playing games while part 2, titled "Known Games And Sources," details what is commercially available at the present time.

Each chapter contains exercises and questions concerning that chapter with answers thoughtfully provided at the end. I must say the book is, in my opinion, extremely well written. The authors take you through all the phases of role-playing games from the initial creation of characters through step by step scenarios in which the characters interact with each other and the imaginary world around them. It is a fantastic excursion into the imagination and really gives you a feel for what role-playing is all about.

Once you have made up your mind to become an Adventurer, the second part of the book will provide you with detailed information on the major role playing systems currently available, their good points and their shortcomings. Also provided is an extensive listing of companies dealing in related products. The amount of information contained in this book is amazing; however, unlike most rule books currently available, this book presents the information in a straightforward and simple to comprehend manner.

Well, for a final opinion and evaluation on the book I turned to my son Chris, a veteran Dungeons and Dragons campaigner. All I can say is "like father, like son." Chris' review exactly paralleled mine and his final comment says it all, "I would recommend this book to anyone into fantasy games."

(Reston Publishing Company, 11480 Sunset Hills Rd., Reston, VA 22090, Order #R0167-8, soft cover, 8½ x 11, 204 pages, $14.95)

— Ken & Chris Boyle

Skeet Provides Keyboard Practice

Computer literacy has, with good reason, become a major goal in schools. Effective use of computers requires familiarity with the keyboard, so one way we can all help our children at home is to find ways to assist them in learning to type. *Skeet* is intended to provide keyboard practice in a game format.

The game starts by asking for the player's name, providing instructions, and asking for the skill level. The chosen level determines how many of the keys can be used, and to a lesser extent, the speed of play. The lowest level is the home row of keys, while at the higher levels symbols, numbers and letters can all be included. High resolution graphics characters are used to display the letters at the bottom of the screen, and either one or two clay pigeons move about on the screen. The object is to shoot the pigeon by using the key corresponding to the letter located directly beneath it. When a shot is fired, a line comes out from the letter at the bottom, and if the shot hits the pigeon, it explodes (complete with sound effects). After this explosion, a new pigeon appears. A running score is kept in the upper-left of the screen.

Skeet is written in BASIC. The inherent lack of speed for moving the pigeons and shooting does not matter to the child who is learning proper use of the keyboard, but the explosions and their sound effects seem to take a very long time. After only a few successful shots, most children become bored with the long wait before new pigeons appear.

The end of the time allotted for play is signaled only by a change in screen color and the fact that no more pigeons appear. After a brief wait with that display you are asked if you wish to play again. There is no master scoreboard display with high scores, which we have all come to expect from similar games, and which serves as an incentive to beat previous scores.

Technically, the program itself has several flaws. A person whose computer cannot handle the high speed *POKE* needs to edit Lines 450 and 665 after loading the game and before running it to eliminate the *POKE*. In addition, the ability to achieve a high score in the game is seriously hampered by the fact that at the higher levels, where keys other than the home row are used, the bottom display line may show duplicates. The instructions correctly point out that if this happens only the key on the left can be used for shooting. In practice that means the player must wait until the pigeon moves to a key on the left before he can shoot and, of course, time is lost while waiting.

In summary, *Skeet* is a good idea, but lacks the features needed to make it sufficiently interesting and challenging for frequent use. I do not think that most children would use it enough to attain even rudimentary knowledge of the keyboard.

(Cancoco Software, P.O. Box 2914, Medley, Alberta, Canada, tape $19.95)

— Carol Kueppers

Hardware Review

MCSI Printer Interface A Helpful 'Devil'

If you are in the market for a printer, there are several things that you will have to consider before making your decision. Aside from price and features, you also have to consider how you will hook up the printer to your CoCo. Several Radio Shack printers have a serial interface that connects directly to CoCo's RS-232 port using a $5 cable. Most other printers, including some of Radio Shack's, have a Centronics parallel interface. In order to hook up one of these printers, you will need a serial-to-parallel converter, which is more costly.

According to Webster, a printer's devil is an apprentice in a printing office. The Printer's Devil is a serial to parallel converter that will allow you to hook up any Centronics type printer. This is done by hooking up one end of this device to your RS-232 port, and the other end to the printer's Centronics port. Since the RS-232 port on the CoCo is also used for connecting a modem, the Printer's Devil also has a connection for your modem, or other serial device. This extra connection, along with the accompanying switch, eliminates the need for any extra 'Y' cables or switching devices to clutter things up.

Hooking up this device is relatively easy. There are only two connections that you have to make, and there is no way that they can be improperly connected. There are also several DIP switch settings that you can choose from in order to control the Baud rate and the word length.

The word length can be either 7-bits or 8-bits. If you have an old CoCo with the Color BASIC 1.0 ROM, then you would select the 7-bit word length. Otherwise, the 8-bit word length would be your choice. The Baud rate determines at what speed data is sent from your computer to your printer. The choices you have here are 9600, 4800, 1200, 600, and 300. Normally, you would choose the 9600 Baud rate for the fastest printing speed.

But this is one of the problems with this device. If you are using OS-9, you know that the maximum Baud rate is 2400. Unfortunately, the 2400 Baud rate is not one of the choices that you have, so you must use the slower 1200 Baud rate setting. Another problem lies in the fact that these changes are all made using a DIP switch which is located inside of this device. In other words, you have to open it up every time you want to make any of these changes. It's very easy to do this, but I couldn't help wondering why it wasn't designed with a rotary switch or some other such device in order to make it a little easier.

The Printer's Devil does in fact work. I had no problems at all using it with my printer, and it also worked fine with a modem at a friend's house. It's not complicated to use, and having to open it up to change the Baud rate was more of an inconvenience than a problem. If you feel that you could live with this, then the Printer's Devil is a good choice.

(MCSI Inc., 1800 West 91st Place, Suite 400, Kansas City, MO 64114, $79.95)

— Gerry Schechter

Software Review

RAM Checker Is Very Reassuring

If you've ever wondered if those new RAM chips you installed were all good or if a flaky chip is causing the system to crash, the *RAM Checker* is for you.

The *RAM Checker* is a ROM cartridge that automatically tests your computer's memory. Unlike Radio Shack's *Diagnostics* cartridge, *RAM Checker* tests all 64K (if you have that much) and tests continuously. You just switch on the computer, select the 16K, 32K or 64K test and away it goes. The program doesn't stop when an error is found; it simply notes the error and keeps looking for more. At any point, you can press BREAK to see if any bad chips were found; you can then press another key to continue. If any bad chips are found, *RAM Checker* simply tells you which bit was bad. The three basic versions of the CoCo use different numbers for the RAM chips, but they all use the lowest number for bit 0 and highest for bit 7.

I ran the check on my machine overnight; it came up with no errors found, which is not surprising since the machine is only a few months old and came with 64K factory-installed.

If you need to test your CoCo's memory, I can't think of a better way to do it than *RAM Checker.*

(Spectrum Projects, Box 21272, Woodhaven, NY 11421 or Box 9866, San Jose, CA 95157-0866, $24.95 plus $3 S/H; manufactured by Saturn Electronics)

— Ed Ellers

Submitting Material To the Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other CoCo owners.

Program submissions must be on tape or disk and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary, explaining how the program works. We're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a SASE to: Submissions Editor, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

Poker And Po-Chek— A Casino Player's Sure Bet

Here are two poker playing programs from a company named *Bye George* that are intended to entertain and educate you to play better poker and hopefully win lots of money. These programs are sold separately but both are geared toward simulating casino poker slot machines.

The first program, simply named *Poker* allows one to nine players to play in turn while CoCo keeps track of all winnings and losings. However, multiple players are playing against themselves rather than against each and every other player's hand, like solitaire poker with more than one player. A selectable timer function lets you play as many "hands" of poker as you can within specified time limits and whoever has the most winnings is the victor of that round of play.

Casino poker machines come in two varieties: one deals the player and dealer a hand and shows them on the screen; the other just deals the player's hand and the object of the game is for you to get three of a kind, two pair or better. This last variation is what these two programs simulate.

Within this framework *Poker* works well with no obvious bugs. Sound effects are used sparingly but effectively to prompt user input or indicate incorrect response. The card faces for both programs use the same set generated from a low but colorful resolution mode. The four suits are large and rather block-like and do not approach the resolution used in the casino machines. They are recognizable and serve the purpose.

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The other program, *Po-Chek*, allows you to play a hand one way and then go back and play that same hand another way to see what the result would have been. You can program the five-card hand with any cards of any suit and then keep or draw on any of them in any combination. This process is then repeated a specified number of times. Watch the rapid hands being played and when the loops are completed the results are printed on the screen with the option to send it to your printer.

Both programs do what they claim: to simulate casino poker machines, and in particular, the ones in the Atlantic City casinos. The documentation for each program consists of three typed pages with enough information to easily run the program. Each requires 16K and will run on tape or disk systems.

Both programs work well, but I must argue with the premise of their end use — to beat the casino machines at their own game, or in other words, to use a computer to beat a computer. Each state has its own regulatory agency to make sure that commercial gambling devices are not fixed in any way, but how many inspectors can read and interpret machine code or even assembly source code for these games? A clever gambling software programmer could easily slip something in the code to monkey with the odds and blow your winning system to shreds. Video slots are not the same breed as their clunky mechanical parents and most dedicated slot players don't trust them. These were complex moving mechanisms that could be more easily checked and verified for honesty but even these can be fixed.

Now don't get me wrong, I have no objection to using computers for beating the casinos. After all, I wrote *Blackjack Royal* for the CoCo, simulating human dealer casino play at a game that does in theory and sometimes in practice give you a fighting chance if you count cards, stagger your bets and do not drink any of that free casino booze. These two Simulations don't mention if the deck is reshuffled after every hand or not, however, since you don't know if the casino machines shuffle every game you are on even footing. Rules and software/hardware mechanisms vary depending upon the company which makes the gambling equipment. One company that has machines in dozens of casinos in Nevada seems to have one model rigged to pay off the first time if the machine sits cold for five minutes. With these kinds of unpredictable odds, other games with human dealers offer better odds and even a pro dealer's eyes can't help but bulge a little with a flush. Compters can't be "read" in this manner.

Every personal gambling system with its own precise number juggling system has an equal dose of personal superstition, intuition and game preferences. If poker slot machines are your preference for scientific gambling then *Poker* and *Po-Chek* are for you. The cost of these programs is less than three minutes of sustained play on the $1 video slots and who knows, you just might get lucky.

(Bye George, 14 Dawson Road, Kendall Park, NJ 08824, $6.95 each)

— J. Michael Nowicki

Universal Video Driver: Good But Not Perfect

The CoCo is probably the only home computer left on the market that doesn't have a video output. By the time you read this, Radio Shack will be selling the CoCo 2 with a color video output for monitor/receivers and other home video gear. If you want to use a high-resolution monochrome monitor for text applications, you're still better off with one of the video driver adapters on the market. While many of these also provide color video on the original CoCo, the CoCo 2's video circuitry makes picking up color composite video very difficult. Mark Data's Universal Video Driver is designed for all CoCo versions and either color or monochrome video (selected when installing the device; a switch is not provided, though it wouldn't be too hard to install one).

Installing the UVD is easy. Five clips pick up black-and-white video, chroma, sound, +5 volts and the ground bus from easily located points on the CoCo's main board. On the original CoCo and TDP System 100 (C/D/E or F series boards) you must pry up the two video chips slightly to clip onto the thin parts of the IC pins; on the CoCo 2 the corresponding points are exposed and easy to get to. If you are installing the board for a monochrome monitor, the green clip (which usually picks up chroma) is connected to a marked point on the driver board. In some cases where the video output is too strong for the monitor, they tell you to connect that clip to ground instead. On the C/D/E boards, they tell you to leave the CPU shield cover off. Instead, I strongly recommend that you position the clips out of the way and put the shield back on, as the shield keeps RFI to a minimum and not using them could cause interference to other TV and FM sets in your house or even your neighbors' sets. (Remember that the FCC can, if trouble occurs, order you to either fix the computer or stop using it under threat of fines.)

My first trial was with an F board CoCo and a Philips amber-screen 12" monitor. I first tried the board in the color configuration to judge the UVD's color output, which looked okay. I then went to monochrome for a more normal operating check. The 64-column Hi-Res text displays look a whole lot better than they do on my top-of-the-line color TV; 85-column displays are still hard to read simply because the CoCo doesn't have the horizontal resolution such dense lines require. I later tried the driver in a CoCo 2 with a Panasonic 13" color monitor. It worked well except in *PMODE 4* (buff/black); the artifact colors usually present in this mode were gone. I don't know if this was the fault of the computer, the driver or the monitor; I do know that the same monitor and driver worked fine on another F board machine. Color monitors, while an improvement over ordinary TV sets, usually don't have the clarity of a good monochrome monitor, but this is changing as dual-purpose video/RGB models with better picture tubes (designed for systems like IBM's PC*jr* that provide 80-column text) become more common. Many people are using monochrome monitors for text and going back to their color TV for more colorful applications.

One problem is that the UVD's audio circuit loads down the CoCo's sound generator so much that the usual TV sound is quite weak. I've heard that this is more common with the F board than on others, so this may not be a problem; if you don't need audio output (such as on a monochrome monitor), just ground the black clip. There didn't seem to be any ill effect on the TV picture, though my set may have been compensating for a change in modulation level. If the UVD does affect your picture on a regular TV, adjust the video level control in the CoCo (R21 on a C, D or E board and R47 on the F board) to return the TV picture to its former state. Unlike at least one other kit, the Mark Data board doesn't include a video output cable; if you are really desperate, the TV output cable that came with the CoCo will work fine if your monitor uses the usual RCA-type phono jack input.

The Mark Data Universal Video Driver should work quite well with any color or monochrome video monitor; it's a well-designed and well-made product and shouldn't cause any problems.

(Mark Data Products, 24001 Alicia Pkwy., No. 207, Mission Viejo, CA 92691; $29.95 plus $2 S/H)

— Ed Ellers

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Willy's Warehouse — A Full-Filling Experience

Your mission, should you decide to accept it, is to fill as many orders and collect as many points as you can while avoiding confrontations by your mortal enemies Whirly Bug, Kamakaze, and Stretch. These were the orders given to Willy as he was being hired by the owner of a large warehouse.

Willy's Warehouse is an exciting game from Intracolor written by George Beskangy, with sound effects by Bob Miller. It is distributed on tape or diskette and is written in machine language. After giving the appropriate load command for your version, the program will run automatically. The disk version is copy protected so you cannot make a backup disk. I would recommend removing the original disk from the drive after the game has loaded. The documentation gives no information on how to obtain another diskette should the original be destroyed.

When the game begins, a black screen will appear displaying either a red or blue box. If the box is red, press Reset until the box is blue before beginning the game. I have never been able to obtain a blue box, only a red or green one. Adjusting the tint on my television was to no avail so I proceeded using the green box. Although not displeasing to the eye, I was a little disappointed I could not view the game in the intended colors.

Once past the color boxes, you enter the title screen and a demonstration mode. Pressing the CLEAR key at any time places you in the options screen. Pressing a one or two determines the number of players, pressing CLEAR again increments the difficulty level and pressing a 'J' or 'K' determines joystick or keyboard control. The ENTER key or fire button starts play. The options initially loaded are one player, lowest level (one) and joystick control. You may pause the game by pressing the Space Bar and restart it by pressing space again. Pressing BREAK aborts the game, while pressing CLEAR aborts the game and returns you to the options screen.

The screen layout consists of a scaffold on which Willy stands, a large set of shelving divided into cubicles and two conveyor belts, one on the left moving downward and one on the right moving upward. The top left of the screen contains the player number, score and number of lives remaining while the top right contains the number of orders filled and the number of incoming boxes not picked up.

The object of the game is simple — fill as many orders as you can, reaching the highest score and level possible. Willy must raise and lower his scaffold, pick up the incoming boxes and either store them in the cubicles or fill an order by placing his box on an outgoing box of the same number. He may move left or right across the scaffold in order to do this. The fire button or ENTER key will pick up or drop a box. When Willy moves left or right he may pick up a box from the incoming belt or place a box on the outgoing belt. He can also drop a box on his scaffold when facing left or right. (The only way to kill Whirly Bug is to drop a box on him.) When the scaffold moves down, Willy faces away from the shelf. Dropping a box now will send it crashing to the floor. When moving upward Willy faces the shelving and may now store a box in a cubicle or pick one up. Placing a box in a cubicle with a question mark will award you various bonus points. Orders may be filled using boxes from the incoming conveyor belt, or from the shelving. If these boxes fall off the incoming conveyor belt, Willy will lose one life. For every 20,000 points, Willy gains one life.

During working hours Willy must always watch his step. Kamakaze sits on top of the shelf and whenever an unfilled order falls off the right conveyor belt he will jump to his death taking Willy with him if he can. Whirly Bug roams the scaffolding trying to knock Willy off before Willy squashes him with a box and wins 500 points. Stretch enjoys pushing boxes off the shelving on top of Willy, killing him. If Willy places a box in the cubicle with Stretch, Stretch will fall to his death and Willy wins 1,000 points.

Playing the game is enjoyable and could become habit forming. Each time you succeed in filling your required number of orders you advance to another level (not to be confused with difficulty level) where you must fill a larger number of orders.

Every five levels you are given a shelf full of boxes and a time limit to fill as many orders as possible, gaining 500 points for each order filled. I do not know how high the levels go but I reached level 12 with very little practice. The challenge comes in using strategy to score points by filling the surprise squares (cubicles), and killing Stretch. You can always put a box on the shelf to score points and then immediately pick it up again to fill an order. My greatest challenge however, came when my wife commented "Let me see Stretch push that box on you." I knew immediately that my time was up — I had played long enough.

The game is well done and the three-page documentation is complete. Except for the fact that I could never obtain the intended screen colors, the graphics are nicely done. All screen movements respond well to joystick control using the Radio Shack Deluxe Joystick. This game would be a nice addition to your library.

(Intracolor, P.O. Box 1035, East Lansing, MI 48823, $34.95)

— Larry Birkenfeld

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Aldaron, A Good Adventure

Aldaron is a text Adventure set in a 'time not so long ago, in a land as far away as never (and as near as tomorrow).' You must rescue a young prince named Aldaron. In a world of elves, trolls, unicorns and bewitching creatures, you are the prince's only chance. The evil necromancer has protected the Black Fortress against all "elfinkind." He did not count on the king getting a human to rescue his son. But it will be very difficult. There are seven different sections of the Adventure. The first objective is to find the Black Fortress. because the prince is hidden somewhere inside. Once found, there are many obstacles to overcome before you find Prince Aldaron. A witch wanders around the castle and frequently casts spells on you which vary from reversing all your move commands to making you so weak that you can't carry anything. Or she might freeze your feet so you can't move. *Aldaron* has a HELP function which will give you a very limited amount of help. The game's author occasionally throws in a little humor when you do things at the wrong time.

Once you have located the young prince, you must wake him from his enchanted sleep and get him back to safety. The evil necromancer will not let you leave the fortress easily. If you get past the necromancer, your task is still not finished. This is where I have been stumped so far. I cannot seem to get the prince back alive. You can find out how well you are doing, as compared with other adventurers, at anytime by typing "SCORE." A score of 300 is a perfect score. You are awarded points by how many portable items you find and return. Added to this score are points determined by how many obstacles you overcome. Also, anytime you type "SCORE" you will be informed of your current rank, i.e., amateur, apprentice, adventurer, etc., and how many times you have been killed. Expect to be killed a lot when you first start. The instructions state that it is extremely difficult to obtain a perfect score of 300, and I agree strongly, but if it was easy, it wouldn't be any fun, right?

The game requires 32K and is written entirely in machine language. It is a mid-range Adventure. The experienced Adventurer will not get bored and it will present a very good challenge to any beginner. The game comes on cassette and you must unplug any cartridges, including your disk controller. Overall, I would recommend this Adventure highly.

(Jade Products, 519 N. Scott Street, Wheaton, IL 60187, cassette $25.95)

— Dale E. Shell

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The TS6821 Centronics: A Reliable Printer Interface

One of the biggest compatibility problems facing the CoCo has always been the printer interface. There are two basic methods of conveying information from the computer to the printer: serial transmission, in which the data to be printed is sent one bit at a time; and parallel transmission, in which the data is sent an entire byte at a time. When using serial transmission, the printer must be exactly synchronized with the computer in order to receive the data reliably, and in order to keep a high degree of accuracy, the transmission speed must be relatively slow (usually less than 4,800 bits per second). However, with parallel transmission the data can be sent much faster and more reliably.

Most serial printers use the RS-232C standard and have a 25-pin DB25 connector, while most parallel printers use the Centronics parallel standard with a 36-pin Amphenol connector. However, when Radio Shack designed the CoCo, they decided to use a 4-pin DIN socket that supplied RS-232C signals at the serial port, and because of this many people have trouble interfacing non-Radio Shack printers. The common solution is to wire a cable to convert the 4-pin DIN to a DB25, which usually works, assuming your printer has a serial port. T & S Electronics provides another solution: the TS6821 printer interface.

The TS6821 comes in a small, black, unmarked cartridge that plugs into the CoCo's cartridge slot. Within the cartridge is a PC board that contains a Motorola 6821 PIA (Parallel Interface Adapter). A 3½-foot ribbon cable comes out of the back of the cartridge and terminates in the 36-pin Amphenol plug. Included with the TS6821 is a five-page manual in a cardboard folder, and a disk or cassette containing the driver programs.

The manual is quite short (there are only 1½ pages of text, with the rest being listings of the driver programs), but is sufficient to get most people started. There is not a lot of technical information, but any information required to program the interface yourself can be derived from the assembly language listing of the driver program.

There are three programs on the disk. *PRINTDVR/BAS* will *POKE* a 118-byte position-independent machine language program into memory. This driver replaces the normal routine used by BASIC so that *PRINT#-2* and *LLIST* work as expected. However, when you press the Reset button, the driver is disabled and must be re-enabled to use the interface. The procedure T & S recommends for doing this is to "cold boot" the computer (which is equivalent to turning it off and back on) and *RUN* the driver again (the included program *COLD/BAS* will accomplish a cold boot without wearing out the on/off button). Unfortunately, this will, of course, erase any program you had in memory, requiring you to reload it.

The third program is *PRINTDIR/BAS*, which will *POKE* into memory a 94-byte program that prints a copy of the disk directory on the printer. Running this program will also erase any program that you had in memory.

Although the TS6821 worked perfectly the first time I tried it and has performed reliably ever since, there are a couple of potential problems. First, and foremost, is the problem of compatibility with existing programs. BASIC programs should work as expected, but some terminal programs and word processors using their own printer routines will need to be patched to work with the TS6821. Second, because it is in a cartridge, the TS6821 cannot be used with a disk drive unless you have the Multi-Pak interface (the TS6821 is designed to go in slot 2).

Is this interface for you? It depends on what type of printer you need (or already have), what type of interface it has, and at what speed it can accept data. It also depends upon whether or not you have a disk drive and a Multi-Pak interface. The TS6821 is definitely not for everybody. My advice to you is pick out the printer you want and then compare the price of the serial version to that of the parallel version combined with the $49.95 TS6821 interface.

(T & S Electronics, 6111 Romany Drive, San Diego, CA 92120, tape/disk $49.95)

— Robert S. French

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Storm Arrows Will Hit The Spot With You

Don't let the name *Storm Arrows* ruffle your feathers —it's the name of a new arcade-style game from Spectral Associates. Written in machine language, a 16K non-Extended BASIC machine (plus a pair of joysticks) is all that is required. The documentation included says it will work on the TRS-80 Color, TDP System 100, as well as the Dragon Data 32. It worked very well on my D-board "self-revised" 64K.

The documentation is on both sides of a folded 8½ x 11 colored paper, and is quite detailed, despite its size. There is a slight discrepancy, however, in the screen display section, in that the screen sides are referenced backwards (i.e., what is said to be on the right side of the screen is on the left and vice versa).

Instructions on the method of play are included, as well as scoring, screen display, bonus points, new game starting, difficulty levels, loading instructions, trouble (possible causes and solutions), and a brief description of six other Spectral Associates machine language games.

When you *CLOADM* the cassette (it's also available on disk), you are greeted with an auto-executing display, and an initialization screen, which allows you to input your three initials for top score record keeping — then you're off! An excerpt from the documentation is justified here: you "use the right joystick to maneuver your 'land skimmer' through the treacherous streets of Talon Alpha in an effort to evade and destroy the Imperial Storm Arrows which pursue you relentlessly." This is true. Although no novice at arcade-style games, I was unable to get a score above 9,000 points beyond the third screen. Once beginning the game, it is quite apparent how the name *Storm Arrows* came into being. Little arrows swarm all over the place in an effort to run into you (although they don't shoot), as well as the deadly Imperial Pursuit Cruiser, leaving contact mines in its wake. Your mission, should you choose to accept it (as if you had a choice once you loaded the game) is to shoot the *Storm Arrows* with your limited number of torpedoes before they run into you. You are awarded an additional land skimmer for completing each six rounds. Additional torpedoes, not to exceed 15 per round on the meter, can be had by destroying the Pursuit Cruiser (two) or capturing the torpedo refueling station (three). In addition, bonus points are awarded for completing each round, which you can see and hear between rounds, and you can press any key while bonus points are being shown to get into a standby mode for a rest.

Packaging is good. You get documentation, a good quality tape with several saves, and a good hard plastic cassette box. If the tape (or disk) is bad, or you want a backup, the documentation has instructions on how to obtain them at a nominal fee. *Storm Arrows*, as well as most (if not all) of Spectral Associates' programs, is copy protected, but with the backup policy, that shouldn't be a problem.

I don't have a lot of games in my library (except what comes on RAINBOW ON TAPE and most of my work is aimed at word processing, spreadsheet work, etc., so when I received *Storm Arrows* to review, I read the instructions, set it up for the kids, and let them play it. Their ages are four, six and eight. I soon found them clammering over who was to play the next game, and asking me questions on what to do. I demonstrated, and 20 minutes later, they were wondering when thay would get their turn again!

Storm Arrows has that fun, addicting quality that most arcade games have. The sound was pretty good in the beginning, but got boring after a long session. The playing field and ships changed colors every round, and I only wish I could progress a few more rounds in the game to see if the sound and graphics change more. That's the best thing about *Storm Arrows* — it isn't one of those games I could figure out and master in a couple of minutes and let sit on the shelf. It challenged me to keep playing, just to beat my old score.

Is there anything I would change? Of course, we all have our little "idios." I would first correct the slight flaw in reversing the screen descriptions in the documentation. I could go for a little more "in-depth" sound, especially between rounds. I would probably change the land skimmer to resemble something more than a stick figure. A drop in price would help make it even more appealing.

Would I buy it now, after seeing it? Yes, but more for my kids, seeing how much they enjoyed it. I liked the initial challenge, but prefer a little more overall pizzazz. It's not one of the best graphics-arcade games of the year, so $24.95 (tape) is a bit high compared to others on the market, however, I have paid more for programs not as good or packaged as well. *Storm Arrows* is an above average game for an average price.

(Spectral Associates, 3416 South 90th St., Tacoma, WA 98409, tape $24.95, disk $28.95)

— Dennis Hoshield

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Touchstone — A High Level, Magical Game

The object of *Touchstone* is to get to the touchstone in the Temple of Ra, but don't expect a description of the magical stone in this review because I never quite made it.

I think overconfidence probably had something to do with my inability to get there because the slow pace of the game does lend itself to a lackadaisical approach. Or maybe it's the fact that *Touchstone* moves so much less slowly than *Time Bandit*, a game that this faintly resembles.

While movement is comparatively slow for a computer game, there is no lack of creativity and the challenge is constant.

You are one of the many priests of Ra who has accepted the challenge of the touchstone. The challenge is a way for any of Ra's followers to become a favored high priest.

You begin at the first plateau of an 11-level trek to the touchstone. While on your quest, you seek to obtain a high score, to collect the varied treasures throughout the maze, and to obtain keys to the doors located between the levels. Various monsters appear at various levels in hopes of stopping you with their touch. But you have the power to eliminate them with a ray that shoots from both eyes in two different directions. In tight spots, you can use the space bar function to paralyze them. You should be selective in its use because it is good once for every 50,000 points.

You also receive an extra man and another freeze for every 50,000 points. You can accumulate a total of five men and three freezes.

The freeze is not to be confused with the pause function, which is available by pressing the ENTER key, stopping all action until you wish to resume play.

You will receive a designated time period for each level of play, increasing in length as you climb new levels. When time expires, you lose your ability to eliminate opponents, virtually assuring your fate is sealed.

There are five monsters, including a squirming snake, a creeping spider, a rolling ball (which resembles a cannon ball), a fluttering butterfly, and a "spastic spark." You won't see some of them until you reach the higher levels. They also gain speed, moving faster than you do.

Likely to cause frustration are the "poof chambers" that are scattered throughout the mazes at, unfortunately, strategic points. You never know when a monster is going to pop out, or how many are coming out at that time.

Like most of the latest Tom Mix creations, the graphics and sound effects in *Touchstone* are exceptional in quality. The use of color, while satisfactory, does not match some of the company's previous efforts. As far as level of action, I would give *Touchstone* a seven on a scale of one to 10. Overall, this is a good game that any company would be proud to claim as its product. However, it is not quite the caliber of some of the other programs in the Tom Mix library.

(Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506, $27.95 tape, $30.95 disk)

— Charles Springer

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Pro-Loc: For Password Protection

Pro-Loc© is a password protection utility for the Radio Shack disk operating system. The program is supplied on a non-protected disk, and is accompanied by a five-page manual.

The objective of the program is to limit access to programs, data files, or text files to only those individuals who have the correct password. The user has the option of creating the six-character password made up of any characters from the keyboard. The protected program cannot be *RUN, LOADed, COPYed,* or *RENAMEd* using the commands from the disk operating system. The password owner, however, has complete control over the program including running it, or if desired, the program can be unprotected, or assigned a new password.

The program author notes that there is a range of 27,000 possible passwords, which should minimize the chances of a random selection of the unique password installed on the program. However, the author warns that given enough time and the right tools the code may be broken.

While the program works as designed with the disk operating system, it is easily bypassed by some "auto loading" programs on the market.

(Dorison House Publishers, Inc., 824 Park Square Building, Boston, MA 02116, disk $15.95)

— Robert E. Foiles

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Affordable *Dapper* A Snazzy Zapper

Soon after Radio Shack introduced the disk system for the Color Computer one began to see ads for 'disk zap' programs. These ads have continued up to the latest entry, *Dapper*. Before we get into a discussion of this program, just what is a disk zap program? Most of these programs are designed to provide the ability to directly read/write, move, and patch data on a disk. Now why would you ever want to do this? Well, how many of you have experienced an I/O Error when trying to load that only copy of a particular program? Or, worse yet, received that infamous message, FS Error (File structure) which is the computer's way of telling you that it can't locate a file? From the letters to RAINBOW and other magazines it appears that many of you have these problems and hence the need for a program like *Dapper*. Personally, in the year and a half that I have owned the disk system, such problems have been extremely small. Of course, I do keep backup copies of important programs, plus I keep an extra copy of the directory in track 36 courtesy of a recent RAINBOW article.

So, if you keep backups and extra copies of the directory, do you really need a disk zap program? Two of my reasons for not buying such a program were need and cost. But along comes a little gem at $14.95 called *Dapper* which makes it possible for every disk user to own a zap program.

Unless you are really into the nuts and bolts of disk operation, *Dapper* will handle most ordinary disk needs. However, before you use *Dapper* or any other disk zap program, you had better understand what you are doing, i.e., read the disk manual and articles on the disk system before you attempt to do any work with a zap program. In other words, if terms such as directory, GAT or FAT (granule allocation or file allocation table), tracks, sectors, and granules put you to sleep, don't do any zapping!

Dapper comes on a disk (of course!) with a 21-page manual. It is written in BASIC with machine language subroutines. Now, before you get all "bent out of shape" that *Dapper* is not a 100 percent ML program, remember, speed is not important here — although I found no problem with *Dapper's* response. *Dapper* provides the following capabilities: 1) ability to backup a complete disk to tape 2) examine a new disk for read/write quality of each sector and if necessary deallocate bad sectors 3) provide a map of all files and the granules associated with each file 4) dump the contents of a sector to either screen or printer 5) move a defective granule to an empty granule where repairs can be made 6) list a directory 7) verify the readability of each sector within a file or files 8) review and correct a sector.

Dapper loads with the usual *RUN "DAPPER"* whereupon the screen clears and the *Dapper* prompt, =>, appears. All *Dapper* commands have the syntax:

COMMAND *parameters >P*

With a standard syntax, it is easy to issue *Dapper* commands (no complicated gymnastic exercise such as shift/clear/down arrow). For example, MAP *filename >P* will send a list of the granules associated with the file "filename" and print this list on the printer. Note that the *>P* redirects a *Dapper* command's output to the printer. If you want the output on the screen, simply omit the *>P*. The MAP command without a filename lists the granule allocations for all files on the disk. The default drive for *Dapper* is Drive 0; however, if you have additional drives simply enter MAP,1 "filename" for a file on drive 1. The MAP command provides not only the granule list but also the track/sectors associated with each granule. With this list you can then use the DUMP command to look at each sector that belongs to the file.

Once you find the sector of interest you can then make corrections using the ZAP command. Both DUMP and ZAP list 64 bytes at a time to the screen. With DUMP you simply examine the contents of a sector; with ZAP you edit the contents of the sector using the arrow keys and inserting the appropriate ASCII or Hex values. In the case of an I/O Error, the cause may actually be an imperfection in the disk, so it would be futile to make any corrections to a bad sector. The MOVE command permits you to copy an entire granule to a free granule and then you can use ZAP to make the necessary corrections. Repairing or editing a disk is not as simple as the above few lines imply. The ability to perform these operations is not necessarily a function of the disk zap program. *Dapper* provides the capability; you have to provide the knowledge.

The DIRECTORY, BACKUP, CERTIFY, and VERIFY commands provide the capabilities that the command implies. The DIRECTORY (which can be abbreviated DIR) command provides an expanded directory which pauses when the screen is full. This command also has a "wild card" option: DIR *xyz* will list all files which begin with *xyz*. The display will list, in addition to the full file name, the file type, data type, first granule, and the number of bytes in the last sector of the file. The BACKUP/RESTORE commands provide tape backup and retrieval for an entire disk. As the manual notes, these commands are slow because of the tape I/O. It took me about 10 minutes to save an entire disk. Although I didn't examine the file structure of the tape copy, it appeared that the disk files were saved as one complete tape file. Thus, you cannot access a distinct file on the tape; but, this is not the purpose of the *BACKUP* command. If you have a good tape system, this could be a cost saver instead of backing up to disk. Personally, I would rather backup to a second disk than run the risk of an I/O Error in the middle of the large tape backup file.

As noted earlier, the CERTIFY command is used to determine the good sectors on a freshly formatted disk. If any bad sectors are found the associated granule is deallocated. The VERIFY command verifies the readability of each sector within a file or files.

The documentation for *Dapper* is exceptionally well done. Each command is discussed on a separate page for easy reference. The discussion covers the definition of the command, format, syntax rules, general rules, and notes. A command summary is also provided as well as several pages of tutorial. *Dapper* also contains on-line documentation. All you need to do is type HELP and a list of commands is printed to the screen; if you type HELP COMMAND, e.g., HELP MAP, a brief synopsis of the command is presented.

In conclusion, I highly recommend *Dapper*. The program performed flawlessly, is easy to use (assuming you understand the disk operating system) and has excellent supporting documentation. All of this for $14.95 — it's a winner!

(Sadare Software, P.O. Box 3891, Gaithersburg, MD 20878, disk $14.95)

— Donald D. Dollberg

Software Review

Timebound: Action Game Sharpens Historical Perspective

By Carol Kueppers

It isn't often that a program comes along which is so excellent that I call my friends and tell them to buy it for their children, but when *Timebound* appeared, that is just what I did. This game, written by Children's Computer Workshop for Radio Shack, combines arcade action with learning the historical time line. Although children learn history in school, it takes some time before they achieve any real sense of when events occurred, or of simultaneous developments in different fields.

Play *Timebound* with your family and the whole family will have a much better idea of where events belong on a time line. Play the game long enough and you will also know precise dates!

The game is loaded from tape following the detailed instructions in the easy-to-read booklet. You'll find you have entered a time machine, where history passes before your eyes. The character Anacron is tumbling through time, from zero to the year 2000, moving out of control from event to event and your mission is to catch him. You are provided with a scanner, represented as a box on the outer edge of the screen, which is controlled by the joystick, and as play progresses, you obtain the information you need to locate him.

Play starts by pressing the fire button, and as you move forward through time, historical events shoot out from the center in 11 directions. At first you see them as small dots, becoming colored ellipses as they reach the outer band in which you can catch them. The scanner moves clockwise when the joystick is moved to the right, counterclockwise when the joystick is moved left and it remains in place when the joystick is centered.

As you catch something in your scanner, time freezes while you analyze your position. At the top of the screen the captured event is named, the year, and at the bottom you are told the event where the elusive Anacron is currently positioned. If the time period is one in which many events occurred in various fields you also see several other colored ellipses, at other screen locations, representing events in other categories which occurred at about the time of the one you caught. You must decide into which of the 11 categories the event belongs, and remember that category's location.

Although you are shown Anacron's present event, you must decide on its category and whether this event came before or after the one you caught. If you decide his event came before your current year, you start moving through time again by pressing the fire button and then pressing the space bar to move backward in time. As you do this, events will start at the periphery and move to the center, so that at any time you know if you are moving forward or backward in time, not only from the rapidly changing date display, but also from the direction in which events move.

During the play of one game the categories remain in the same place, but this changes with each new game. At first

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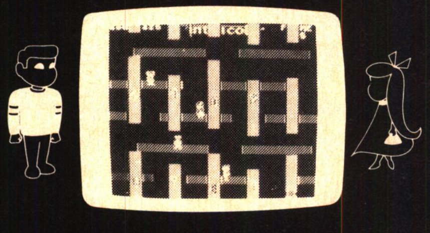

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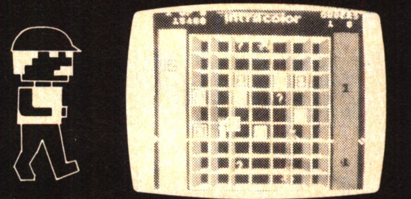

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you try to catch events in different screen locations, so that each category's screen location becomes known. Then, when you approach the correct time period you have only to position your scanner in the proper location to trap Anacron. It isn't that simple though, for as time speeds by, Anacron shifts position, indicated by a beep, and the closer you are to him, the more he moves, adding to the fun and challenge of the game.

Obviously, the more you know about when events occurred, the quicker you can zero in on Anacron. If, like me, you search for the pressure cooker in the 20th Century, it will take you a long time to find Anacron, but, fortunately, the more games you play, the more familiar you become with the events covered.

Timebound provides 11 different categories: scientific tools, sports, household items, political leaders, water transportation, fun and games, architecture, land transportation, communication, time, and air and space. These topics are well selected to interest the broadest possible group and keep them involved in playing the game. There are 11 different skill levels, ranging in difficulty from Level one, where Anacron shifts infrequently from event to event within the same category. Once the screen location for that category is found all events can be trapped until the correct one is found. In Level 11, where Anacron shifts rapidly through all 11 categories as well as from event to event, the player must quickly determine the screen locations for 11 of the categories, and know whether he should move forward or backward in time.

You are given 15 minutes to find Anacron, and as the years whiz by, your elapsed time is shown on the screen. When time freezes as an event is caught, so does the elapsed time counter, so that you can, for example, make notes as to where each category is located on the screen. When Anacron is found, the screen flashes, sounds play and the time taken to find him is given, so that you can try to improve in the next game. At all skill levels, players quickly develop strategies, and the more they play and become familiar with the events used in the game, the faster they can find Anacron. The allotted time is adequate, and encourages thinking while playing, rather than reliance on chance.

As the years rush by, there are time periods with few events, or events in only a few categories. As one child exclaimed to another as 800 to 1000 zipped by on the screen, "No events are coming out!" The reply he got was, "That's the Dark Ages, nothing much happened then, anyway." Thus, without ever catching a single event, the player gets some idea of which historical periods are extremely active in development of all fields (in the 1900's, events come thick and fast!), and other time periods where considerable time elapsed between discoveries.

This is a terrific program. Since the play of the game incorporates the historical time line, everyone has fun while learning. The categories and events selected are a delightful combination of the serious and the whimsical, and very appealing to children. Prepare yourself for a series of quizzes on, for example, when roller skates were invented, or Indian Chess. Many players will want to check out what some of the things are — I'll be visiting the library to read up on carracks.

Timebound is intended for ages 10 and older, but don't be surprised if younger ones join in the fun. Although only one person plays each game, a group likes to gather behind the player and give advice as to which category is where, what event came first and so on. Thus, if your family includes children 10 and older as well as younger ones, the children as young as eight will soon start playing, even though initially they are not familiar with the events mentioned. If you have a child over 10, you will want this program.

I, for one, hope this is only the first in a series, and that another version of *Timebound* will be produced using more categories, or extending the time line back to include ancient events, combining events everyone should know with events everyone will enjoy knowing. If you want to see what computer education can be, I urge you to try this program.

(Radio Shack, requires Extended Color BASIC and joysticks, tape, $19.95)

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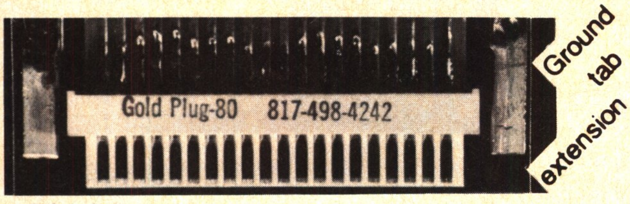

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Color Math Practice Affords Better Skill

By Bruce Rothermel

One of the most asked questions from non-computer owners is "What can a personal computer do for me?" My stock answer for inquirers who are also parents is, "Make your kids smarter than you are."

The educational capabilities of home computers have received the greatest amount of press. This has been reinforced by the "guilt" series of advertisements from Atari, Commodore and Texas Instruments. (Remember them?) This series of advertisements inferred that if you did not buy your kids a ___ brand home computer, they would not be prepared to function in this Brave New World.

It's a shame that the educational capabilities of home computers have been treated with so much hype. Poor advertising tends to create a negative response to the subject. Certain areas of a child's education can be very effectively reinforced by having the student interact with a computer.

One of these areas where the computer is quite effective as a learning aid is where repetitious drills are used. As a parent of a 10-year-old girl and a seven-year-old boy, I know I should be reviewing their spelling words and math quizzes with them, but after a full day of fun and frolic at the office followed by the drive home, I often don't take the time to work with the kids.

Fortunately, there have been many outstanding educational programs written for the Color Computer. The difference between good programs and bad programs seems to boil down to a single question: "Do the kids want to use them?" If the programs hold their interest and are fun, they will be used; if not, they don't do much good sitting in the cassette holder.

The CoCo has a lot going for it regarding its capabilities to run interesting programs. The color, graphics and sound capabilities are outstanding. Recently another capability was added to its inventory of interest holders — *speech.* Yep, now your Color Computer can talk to you.

Voice packs using the Votrax SC-01 synthesizer allow your Color Computer to speak words, phrases and numbers contained in or generated by BASIC programs.

Jarb Software has released a program which uses the capabilities of the talking CoCo to improve the basic math skills of the user. Called *Color Math Practice,* it offers the choice of doing addition, subtraction, multiplication or division problems.

The addition/subtraction problem sets consist of 18 problems appearing in different formats. Sometimes the problems are presented in a vertical format:

 23
+11
——

Other times the problems are given in a horizontal format:

23+11=

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Sometimes the formats are varied:

23+   = 34

All numbers and answers are positive whole numbers. An automatic difficulty level has been incorporated in the program which increases the level of difficulty as problems are properly answered and decreases the difficulty as a consequence of wrong answers. At the end of the program, the student is given a level number which the computer asks for when the program is run.

This varying difficulty level makes the program appropriate for a wider range of grade levels. Both my second and fifth graders were challenged as the computer raised the level of difficulty to their working level. At the lowest level, the numbers will be between one and 15 while at the highest level they will be between one and 1472. The number (level factor) between 1.0 and 4.9 does not relate to any grade level.

The multiplication/division problem set consists of 16 problems also appearing in different formats. You specify the largest multiplication table (up to 99) you want used in the problems.

Another nice feature of the program is the ability to choose how you enter your answers. The choices are:

Right To Left — like you would do the problems on paper or, Left To Right — like you would write the answer if you already knew it.

The Right To Left method is recommended for addition/-subtraction problems as it allows you to work with one column at a time. When using this method of answer entry, the right arrow key functions as a backspace key. The Left To Right method is recommended for multiplication/division problems as it is the normal way of inputting a known answer. In both methods the CLEAR key will clear the answer line and let you start to enter your answer again.

Well, that's how it works mechanically, but how does it perform? Does it hold the students' attention and challenge them enough so that they *use* the program?

Since this is an educational program, I'll give it a grade of B+. On the positive side, the mechanics of the quiz are excellent. The challenge of *Color Math Practice* caused by raising the difficulty level keeps the program interesting to the user. It also makes it a versatile teaching reviewer since it can be used with children of different grade levels. The use of speech is unique. Voice rewards are given for the correct answers. The slightly electronic, Swedish East Coast voice says one of a series of rewarding phrases "Yes, that is correct"; "Super, that is perfect"; "OK, nice going" and other rewarding praises when the correct answers are given. When the answers are incorrect, Uncle Sven says "That is wrong"; "Sorry, you are wrong"; "No, practice makes perfect", etc. The varying presentation format adds another challenge to the exercise.

On the negative side, the introduction to *Color Math Practice* is spectacular. It uses the full range of capabilities of the CoCo to present the program title. Unfortunately, in the program there is little such "flash" to hold the students' interest. No color, no sound. The number/character set shown on the screen is the standard Color Computer's black numbers on the green background.

While *Color Math Practice* greets the student with his name after it is entered, it is not used in the program. It would be easy to add the user's name in the response after the question is answered. "Sorry, Bonnie, that is wrong" would be better than the impersonal verbal response given.

Another addition I would like to see is the giving of a score at the end of a group of problems. While this may be difficult with the program varying the difficulty of the problems, a score at the end of each session would give the pupil a "target" to beat on the next round.

Overall, the pluses of *Color Math Practice* greatly outweigh the deficiencies. It makes the tedious task of reviewing math problems fun.

(Jarb Computer Products, 1636 D Avenue, Suite C, National City, CA 92050, requires 32K Extended and Votrax Voice Pak, $32.95)

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Hack Away With Johnson Utility Packages

By Gerry Schechter

To say that the OS-9 operating system is a sophisticated and powerful one would be an understatement. Despite this, no software is perfect or complete so there is always room for improvement. Usually these improvements fall into the "wouldn't that be handy" category of utility-type functions. Sometimes, though, they fall into the "how could they have left that out" category.

Such is the case with a new set of OS-9 utility packages recently introduced by D.P.Johnson. These new packages, known as *SDISK, BOOTFIX, Filter Kit#1*, and *Hacker's Kit#1*, run the gamut from nice-to-have, to have-to-have utilities. Together, they will allow you to do just about anything you can think of with your OS-9 system. Since we have a great deal to cover here, I will not be giving you all the details of each of these packages. Instead, I will give you just enough of a description to whet your appetite and give you the general flavor of them.

The *SDISK* package will allow you to access any type of OS-9 disk format. This includes 35-, 40-, and 80-track drives, single- or double-sided drives, single- or double-density formats, all with your choice of six, 12, 20, or 30 millisecond stepping rates. In order to accomplish this, there are several other programs included. The *DESCGEN* program is the one that you will use to generate your new disk device descriptors. These descriptors tell OS-9 what type of disk drives you have, and all you have to do to generate them is to answer a few simple questions. By combining this program with the OS-9 SAVE and OS9GEN commands, it is a simple matter to create a new OS-9 Boot disk with your new device descriptors in place. The other program included here is *SFORMAT*, which is a replacement for the OS-9 FORMAT command, that will allow you to format a disk in any of the above-mentioned configurations. Even if you have standard RS disk drives, you can get them to step at 20 milliseconds. This not only allows them to run faster, but also quieter. In fact, you will not believe that they are the same old drives you are used to.

The *BOOTFIX* package, actually only one program, will allow you to create a bootable double-sided OS-9 disk. It does this by rearranging the OS-9 Bootfile to where the bootstrap program expects it to be. I was unable to verify this, since I do not have double-sided drives, but if the performance of the other programs is any indication, I'm sure that it works.

The *Filter Kit#1* consists of 12 different programs. Most of them can be used by themselves, but their real power is exploited by using OS-9's I/O redirection and pipes capabilities (more on this later). Very briefly, these programs are as follows:

LS —	lists filenames, one per line, with several selection criteria
BUF —	reads standard input until EOF and then writes to standard output
CP —	copies files from one directory to another
DL —	deletes files
FLIST —	lists files
INFO —	displays information about files, such as date, bytecount, and attributes
MV —	moves filenames, but not the files, from one directory to another
PAG —	lists files with formatted output, including page numbers, margins, and heading lines
REMOVE —	removes filenames, but not the files, from a directory
SELL —	changes the owner number of files
SETAT —	changes the file attributes of files
SORT —	sorts a list of filenames

No big deal, you say. How about a few examples of using them along with I/O redirection and pipes? Let's copy all of the files in the current directory to another directory:

```
LS ! CP /D1/NEWDIR
```

Now, let's print an alphabetical listing of all of the files in the current directory.

```
LS ! SORT >/P
```

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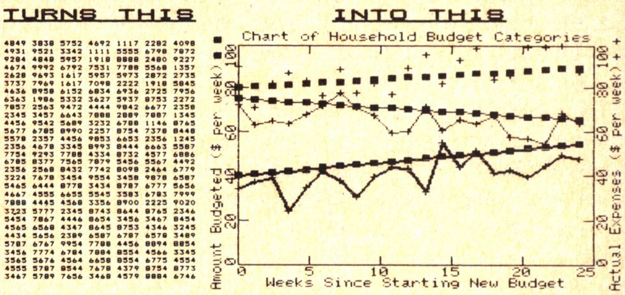

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Now how about printing all of the files in the current directory in a neatly formatted listing?

```
LS ! FLIST ! PAG >/P
```

Are you getting the idea behind all of this? The combinations and permutations are almost limitless and boggle the mind.

The *Hacker's Kit#1*, as its name implies, is for the advanced (and/or brave) OS-9 user. There are several programs in this package and, as the documentation mentions, you will need a fair knowledge of assembly language and the inner workings of OS-9 to fully utilize them without crashing your system. *DISINP* is a disassembler, which you can use to find out how things work in OS-9. For example, to disassemble the DIR command, you would enter *LIST /D0/CMDS/DIR ! DISINP. Filter* filters out all occurrences of a given Hex value from a file. For example, to remove all carriage return characters from a file and create a new file, you would enter *FILTER 0D <OLDFILE>NEW FILE. Memlist*, will list the contents of any memory address in unformatted binary. Normally, you would pipe the output from this into the OS-9 DUMP command, so that MEMLIST 0 200 ! DUMP will give you a Hex dump of the first 200 Hex bytes of memory. *MEMLOAD* will load from standard input (the keyboard) into memory at the absolute address you specify until an EOF is encountered or your system crashes, whichever comes first. Usually, you would redirect the standard input to a file so that MEMLOAD 2000 </D0/OS9BOOT would load the OS9BOOT file into memory starting at Hex location 2000. *Rewrite* will write to a file starting at the Hex offset that you specify. In other words, you can replace only a portion of a file with this command. You could use this, for example, to patch your OS9BOOT file if you really know what you are doing. *Split*, the final program in this package, will split (what else?) a file into multiple files. Here you specify how many bytes or lines from the input file are to be copied into each of the output files. This can be very handy when you want to split up a large file for easier editing.

I have only scratched the surface of what you can do with these marvelous programs. During the time I had them for review, I had no problems at all with any of them. The documentation provided does an adequate job of describing the uses of the various programs but, as is often the case, I thought that there should have been a few more examples of their use in some cases. To be fair though, the documentation does suggest that you re-read your OS-9 manuals in order to fully understand what's going on.

SDISK and *BOOTFIX* are a must if you have non-standard disk drives. *Filter Kit#1* will give you a lot of handy capabilities, and should be considered by all. *Hacker's Kit#1*, on the other hand, is not for the uninitiated, and will be of little or no value to you unless you really have a firm grip on the inner workings of OS-9. Of course, if hacking is your thing, then by all means buy it and have fun.

(D.P.Johnson, 7655 S.W. Cedarcrest St., Portland, OR 97223, 64K/OS-9, *SDISK* $29.95, *BOOTFIX* $9.95, *SDISK & BOOTFIX* $35.95, *Filter Kit#1* $29.95, *Hacker's Kit#1* $24.95)

OS-9 Disk Fix And Utilities — Disk Utilities And Then Some

By Gerry Schechter

As with any new operating system, in this case OS-9, there is always a shortage of good utility programs at first. With the ever increasing number of CoCo owners today, it is usually only a matter of time before new programs become available. Utility programs, in general, fall into one of two categories. They either add features that were left out of the operating system or they greatly enhance existing ones.

OS-9 Disk Fix and Utilities is a set of programs that falls into both of the above mentioned categories. It consists of six utility programs and several other files that make it easy to change your disk device descriptors (more on this later). I will first describe the various utility programs and then the procedure for changing the disk device descriptors, so here goes. . . .

The *DIRCOPY* program is a disk-to-disk copying program that will really simplify the copying of files from one disk to another. This program has many options which are as follows: The Confirm Copy will first display the filename to be copied, and then wait for a "yes" or "no" response to see if you want to copy the file or not. The Enable Automatic Rewrite will automatically delete and then copy any file that already exists on the output disk. If you do not choose to use this option, you will be prompted to see if you want to rewrite the file. The Enable Sub-Directory Copying will automatically copy files from the input disk that are found to be part of a sub-directory. If you do not specify this option, these files will be excluded from the copying process. The Sort Directory will first sort the filenames on the input disk into alphabetical order before any copying takes place. The Copy Only Outdated Files will only copy those files from the input disk that are newer than existing ones on the output disk. This can be very useful in making up a master backup disk since only those files that were updated since the last backup will be copied, thus saving time.

DIRCOPY also has an interactive mode of operation. In this mode you can decide which files you want copied, and the order in which they will be copied, before the actual copying takes place. The important thing here is that with the exception of the Confirm Copy option, the use of the interactive mode does not in any way preclude the use of any of the other options.

The *PATCH* program will allow you to inspect and/or modify any file on disk. It, too, has many options. These include a Find command to locate a hexadecimal or ASCII string in the file, commands to move back and forth through the file, and a Help command. It also includes a Verify command which will restore the header checksum and module CRC bytes in the file. This is a necessary feature, since OS-9 has these checks for a reason and you would get an error trying to load a file with a bad checksum.

The *FILELOOK* program is an easy-to-use program that will simply display the size, type, revision number, and name of any modules contained in a disk file. I'm not sure why you would want to know this information, but I guess it's nice to know that you could find it out.

The *COMPARE* program will compare (what else?) any memory resident module against a disk file on a byte-for-byte basis. This can be useful to make sure that you have loaded or saved a file without any errors. You could also use it to make sure that you have modified a file properly by making sure that they do not compare at the appropriate location.

The *NEWFMT* program is an updated version of the *FORMAT* program supplied with OS-9. The difference here is that you can format disks with up to 40 tracks, as well as double-sided ones.

The final program is *DMODE*. This is the one that you would use to change your disk device descriptors. It will allow you to display and/or change the number of sides on the disk, the number of tracks, the stepping rate of the drive, and whether or not the write verify function should be turned on.

The other files on the disk are included to help you create a new *OS-9 BOOT* disk with the changes that you made with the *DMODE* program. One of these files is a new *CCDISK* module, which will accept non-standard values for the disk device descriptors (unlike the one provided by Radio Shack). The other files are just OS-9 procedure files which help automate the process. Creating a new *OS-9 BOOT* disk is a relatively easy process, although it does take about 20 minutes on a two-drive system. If you have a single drive system, you could probably figure on about 45 minutes because of all the disk swaps required.

Since I have a standard Radio Shack disk system, I was only able to change the stepping rate, from 30 m.s. to 20 m.s., when I created my new *OS-9 BOOT* disk. However, when I finally booted up my new disk, I was pleasantly surprised. Not only were my disk drives running faster, but they were also running quieter.

OS-9 Disk Fix and Utilities is a fine example of a "package" of useful utility programs. Since they are the only utilities of their type that I have ever used, I cannot comment as to whether they are better or worse than others. I can say, however, that I had no problems at all in using any of them. The documentation provided clearly explains how to use each of the programs, although it does assume that you are familiar with your OS-9 system. The disk it comes on can be easily backed up and, in fact, after you have created your new *OS-9 BOOT* disk, you will already have three extra copies of the programs. If you are looking to start up your collection of OS-9 utilities, this package deserves careful consideration.

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Disk Utility Is Very Handy

If you're like me, you've got lots of files on your disks and they've ended up in no particular order. When you find that a disk is full, you save to another disk. Pretty soon you end up with lots of files that you don't need and you have to go from disk to disk to find one you do need. A lot of my files are text, and to see what they are I've had to load a word processor and examine them. Then there's the slow backup and disk formatting operations. When you see what Spectrum's *Disk Utility* can do, you'll know why it has proven itself very quickly at my house.

Disk Utility reads the directory on a disk and then gives you many options in handling the files. You don't even have to type filenames; just move the list up and down with the arrows until you find the right file. You can examine files (great for text, not so hot for BASIC programs, nearly useless for machine language files), change filenames, kill files, and even rearrange the directory to put the files in any order. (If copying disks to tape, this will let you specify the order the files should be in on the resulting tape.) Another function gives information on the size of files, what type they are and the loading addresses. When finding a program you want to run, simply press two keys and *Disk Utility* loads and executes it for you.

Disk Utility can also format and backup disks faster than Disk BASIC's own *BACKUP* and *DSKINI* routines. You may have noticed that when you do a *DSKINI*, the system starts at track zero, works its way up to track 34, then runs the head back to zero and verifies the new tracks. *Disk Utility* simply goes up to 34 on the first pass and then works backward to zero on the second. Backups are that much faster as well; *Disk Utility* switches between disks much less often, so on a single drive system you only have to swap disks four times instead of eight.

There's also a set of "super utilities;" a copy program that makes it easier to move files around, a kill routine that lets you delete old files very quickly, and a user information routine that lists the details on all the files on a disk and does it to either the screen or the printer.

If you do any serious work with disks, get *Disk Utility.*

(Spectrum Projects, Box 21272, Woodhaven, NY 11421 or Box 9866, San Jose, CA 95157-0866, $24.95 plus $3 S/H)

— Ed Ellers

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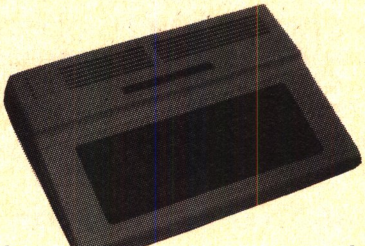

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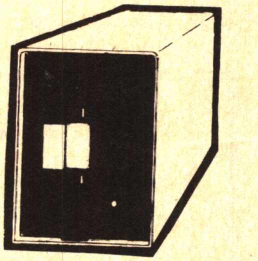

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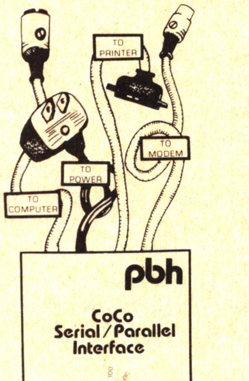

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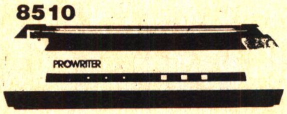

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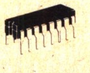

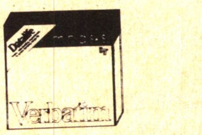

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Experience Versatility With *NEWBASIC*

"What's wrong with old BASIC?" I asked myself as I proceeded to boot up the latest review candidate. I *LOADMed NEWBASIC* and, as I reached for the instruction manual, I noticed the screen flash as the program self-executed and self-inversed video. It looks like we are off to a good start.

"That's all very nice," I said to myself, "but what does it do for me (and all other users)?" To find out, I had to read the instruction manual. While reading the clear, concise instructions, I realized what a versatile and useful program I had just loaded into my CoCo.

The program name is *NEWBASIC*, I would call it "DOS SUPPLEMENT." The program gives you the commands for Disk BASIC that Microsoft left out for CoCo. You could say it is like a "tool kit," but a lot less confusing and easier to use.

After one evening with *NEWBASIC*, I wanted to see if it could not be made part of resident DOS by changing the chip. Later, I discovered the program is not compatible with all other M/L programs.

After loading *NEWBASIC*, you will find that all of your traditional commands still function as expected. First, let's examine the additional command words or toggles.

INVERSE ON or OFF, the default is ON so that you have a black screen at start up.

CLICK ON or OFF, the default is ON so you will hear a speaker click for each key pressed.

BREAK ON or OFF, the default is ON but if you wish to disable the BREAK key then BREAK OFF is the direct command.

UNDERLINE <COLOR> or OFF, the default is OFF but you may select colored underlines on the text screen with the UNDERLINE 6 direct command.

WRAP ON or OFF, the default is ON. This command is similar to word wrap of many other programs.

ECHO ON or OFF, the default is OFF because everything displayed on the screen is ECHOED to the printer. (Faster than *POKE111,254:DIR* to get a quick directory hard copy.)

PAGE ON or OFF, the default is OFF but if on, it prevents the screen from flying by if your display is longer than 15 lines. The PAGE ON function requires a key press to advance to the next screen full of text.

LOWER ON or OFF, will control the printing of lowercase letters on the screen.

That concludes the list of ON/OFF command toggles, but leads us into the good stuff.

Type in RAINBOW from the command line and it will give you the byte count of a program in memory.

The HIDEDIR and FETCHDIR commands followed by the drive number will write and retrieve a duplicate directory on your disk. It's a lot easier than repairing your directory the long way.

SPEED=<NUMBER> allows you to specify the screen printing speed within a range of 100 (slow) at 250 (the fastest). The default value is set at 250.

If you are using communication files, word processor files or need to see something in a BASIC program, just type FILELIST (FILENAME) to see the file displayed on the screen. Add ECHO ON, and finish with a quick hard copy, all without leaving your current tasks.

If you have ever wondered what the addresses were on those M/L programs, just enter the command FILEINFO (FILENAME), and you will be treated with the starting, ending and executing addresses and the length.

If you want to know what is in memory, type DUMP (Hex ADDRESS) and the memory contents are displayed on the screen from that address on up. The screen scrolls in this mode but any key will pause and pressing the BREAK key will abort.

If you ever need to get out of *NEWBASIC*, (Reset won't do it) just enter the command BASIC.

For those of you who want to use graphics, try SSET and SPOINT. They behave like set and point but in the semigraphics mode. (That's how they do the underlining).

NAME and COMMENT are some of my favorite commands. Those commands allow you to put a volume name on each disk and a 14-character comment line behind each filename on the directory display.

Even the serious programmers can use error trapping routines such as: ON ERROR, GOTO, (LINE NUMBER), PRINT ERR, PRINT ERL, ERROR (NUMBER) or RESUME.

Last but not least, 10 programmable keys with various default values, i.e., DIR, SPEED, UNDERLINE, RUN, FILEINFO, etc. These values can be changed at any time from the keyboard and are invoked by pressing the down arrow and a number key zero through nine. This is my only problem with *NEWBASIC*. I don't know how to change the key defaults permanently, or at least save them to a file that can be appended to *NEWBASIC*.

After reviewing *NEWBASIC*, I now have a list of four programs that I consider outstanding. All disk users should consider the purchase of this versatile utility.

(Valley Micro Software, 801 W. Roseburg Ave., Suite 200, Modesto, CA 95350, $34.95)

— Ed Sehlhorst

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Lost some disk jackets lately? How about creating your own with your own printer and printer paper? *UTILITY 1* is a disk utility that uses any printer capable of condensed print (132 or more columns) to print a file allocation table (FAT) and directory on a sheet of 8½ x 11-inch paper. The idea is to fold and glue the sheet of paper into a disk jacket with all the disk's appropriate information already printed on the jacket. The process is really quite simple. After loading the program, entering your supplied password and a title for the disk, the program continues to print the FAT in decimal and hexadecimal numbers, the directory, and a whole lot of advertising. The paper is then removed and folded at the pre-printed dots on the paper and glued together at the folds to form a disk jacket that is capable of holding up to four disks if need be.

The printout is a little hard to read at first. The FAT entries are printed vertically, i.e., if granule 0 contains a 255, the 255 is printed one digit on top of the other, all the way across the page for all 68 granules, with reference markers showing which granule number you are looking at printed underneath. The hexadecimal version is done the same way just underneath the reference markers. Rounding out the remainder of the front side of the disk jacket, taking up the top half, is some of YGS's advertising, along with an order form to mail. Pretty sneaky, and it makes for a cluttered looking jacket cover. On the other side, the directory entries start with the disk name at the top and two columns of listings. The listing is well done, showing the program name and extension, type (BASIC, ML, etc.), ASCII or binary, the start granule number of the program in Hex and decimal, and the number of granules used by the program also in Hex and decimal. Each side of the listing contains titles with the columns explained in detail at the end of the directory listing. Also listed are any killed files still remaining as directory entries with a number sign in the first position of the program name, indicating the program has been *KILLed* and is possibly recoverable. At the end of this side of the jacket YGS has printed their name and address as well as a short advertisement.

The program disk comes supplied with *UTILITY1.BIN* and *PRINTER.NEW*. One note here. My disk for review also included *MAP1.BIN*, which was not mentioned in the manual at all. The manual stated that a password is supplied with the manual, but there was none to be found. It also states to *LOADM"UTILITY1.BIN"*, enter the password and continue. Since I had no password, the program would crash every time. Onward to more bold things. Try loading *MAP1.BIN*! It worked but had a different screen when it started than *UTILITY1* did.

PRINTER.NEW is a BASIC program saved in ASCII which contains all of the printer lines to be merged into a program in memory created out of *UTILITY1* (or *MAP1* in my case). The codes are initially set up for Epson printers, but can be changed to any printer by simply loading *PRINTER.NEW* and rewriting all of the printer codes. It's not that difficult, as almost all of the lines that use special *CHR$* codes are commented to indicate which codes perform which functions. The program line numbers cannot be changed and must be resaved in ASCII as *PRINTER.NEW* (*SAVE "PRINTER.NEW,A"*) in order that it can be *MERGEd* into memory later.

The manual is very brief and to the point. YGS seems to care about its customers, and includes notes on their service policy, user registration, warranty, testing, telephone inquiries, and of course, more advertising. Backups can be made, but not executed. The original disk must always be used to run the program, although it can be restored from a backup and run again if the original disk becomes non-usable.

YGS is offering *UTILITY1* free with any other purchase of the software they market, or a $4 U.S. charge for shipping and handling that is required if the program is ordered on its own — well worth the price and a good original idea.

(YGS, P.O. Box 208, Brechin, Ontario, Canada L0K 1B0, disk $4 U.S., $5 Can.)

— Eldon Doucet

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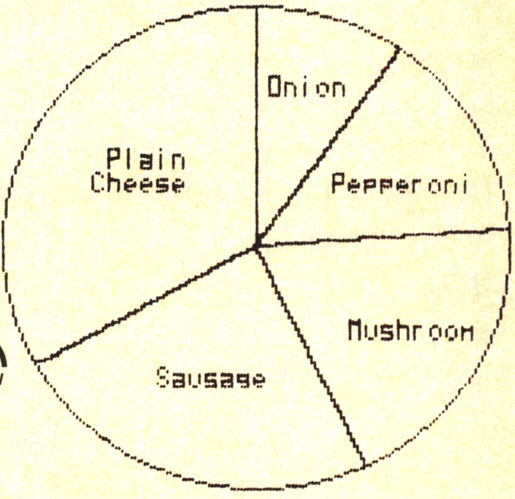

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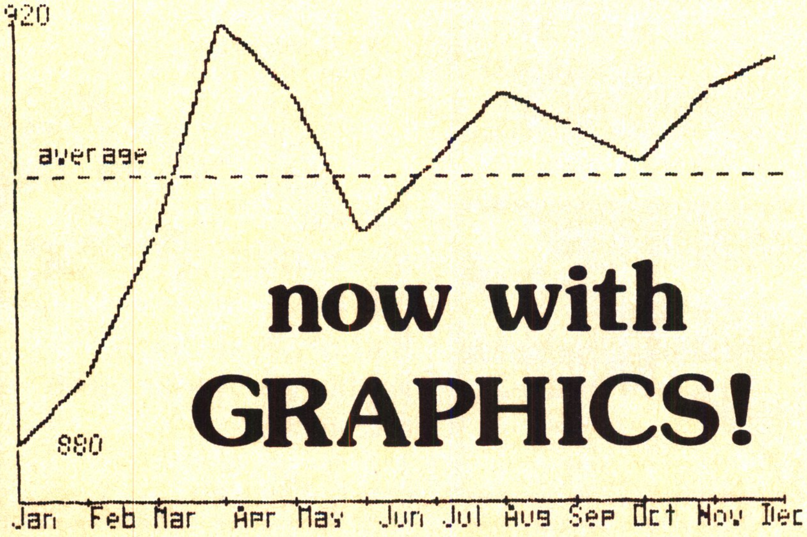

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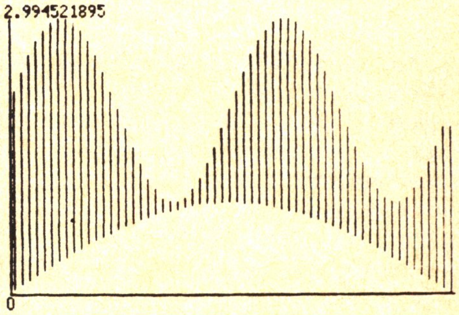

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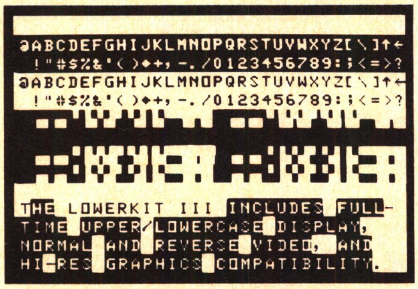

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@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑←
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑←
 !"#$%&'()*+,-./0123456789:;<=>?

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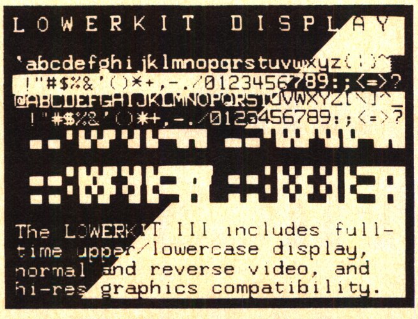

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LOWERKIT DISPLAY
`abcdefghijklmnopqrstuvwxyz{¦}~
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^
 !"#$%&'()*+,-./0123456789:;<=>?

The LOWERKIT III includes full-
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normal and reverse video, and
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LOWERKIT III Display (reverse video, too)

Three years ago, the Lowerkit made history and set the standard in Color Computer lowercase. For example, game and education programs from Sugar Software have Lowerkit display options. Spectrosystems' ADOS supports the Lowerkit; so does Cer-Comp's TextPro. Cartridge Scripsit looks beautiful with a Lowerkit. Spectrum Projects, Cheshire Cat and many others have developed beautiful alternate character sets which you can download from Micronet, burn into an EPROM, and snap into your Lowerkit.

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EDT — An Excellent Editor For Assembly Language Programming

Most editors and word processors are designed for general purpose use. Few are tailored for a particular job. *EDT* is an editor specifically designed for assembly language programming on the Color Computer. It features many useful aids for the programmer who is composing code at the terminal (hacking away). It won't function as a general purpose editor, so it might not suit the style of all programmers. But for straight code typing, it can't be beat.

EDT is supplied on disk with several copies of the program, which can easily be backed up to another disk. You can customize the loader to select a number of options, including printer page formatting and Baud rate, default editor options, disk track access rate, and default edit file name. The 51-page manual provides a comprehensive discussion of each option, and gives you a short introduction to using the system by working with sample text file. The manual concludes with a single page summary of the editor options, with page numbers of the full description serving as an index. The only problem with the manual is the attempt at a clever style of writing, which ends up being childish at times.

EDT offers most of the normal text editing functions. It is a full-screen editor and displays text on a high-resolution 51-character by 24-line screen. You can mark blocks of text and move, copy, or delete the blocks. You can search for strings (even using matching patterns) and replace selected strings.

In addition to these normal editor functions, *EDT* includes features for assembly language programming. Foremost is the screen format. *EDT's* normal mode keeps the cursor on the center line of the screen. This allows you to see 10 lines above and below the line you are working on. If you would rather have traditional scrolling from the top or bottom of the page, a single key stroke toggles the scroll mode. You can also easily switch between insert and exchange modes for text entry or editing.

EDT limits you to a fixed assembly language format. The space bar is transformed into a tab key to keep the program formatted in four columns for labels, opcodes, operands, and comments. Files are saved in a compressed format which uses the space character to represent the tab, rather than storing the displayed blanks.

Many of *EDT's* options assist you directly in working with assembly language programs. You can get a list of labels used in the program, or check to see if a particular label has been used. You can also find a particular label (jump to subroutine) and return from up to 10 levels of subroutines. This allows you to trace through complicated subroutine calls while editing the program. Normally you only find such capability in a symbolic debugger, while running the assembled code. A built-in Hex/decimal calculator does arithmetic in either base, and converts from one base to the other.

EDT has a number of features not usually found in inexpensive software. The program runs on a 64K CoCo and gives you every possible byte available for editing your program. Even with the high-resolution screen, you have over 48K for your program. In addition, you can handle text files up to 21 grans long (almost 1/3 of a disk)! The program also checks to see that your printer is ready before trying to send data. This relieves the annoying "hang up" when you try to access a dead device. In addition, *EDT* allows you to type brackets, braces and backslashes, giving you the complete character set for Motorola 6809 assemblers.

EDT features load and save commands which allow you to work effectively with a library of subroutines stored in a single file. The save command allows you to append a portion of your current edit buffer to another file on disk. The append/load command will search a library for a particular subroutine. When it finds a specified label, it appends the text until encountering a blank line (used to separate subroutine blocks).

Sonburst Software has done an excellent job in producing an editor for assembly language programming. It offers a good level of user interaction, and provides the features most often needed for assembly language composition. You might choose to continue programming with an ordinary text editor, or with one of the limited line editors supplied with many popular assemblers. However, *EDT* represents a total approach to customized tools for the serious programmer. Combined with one of the many fine assemblers and debuggers on the market, you will have a winning combination for your battle with machine language.

(Sonburst Software, 233 S.E. Rogue River Highway, Grants Pass, OR 97527, 64K disk $39.95)

— Stuart Hawkinson

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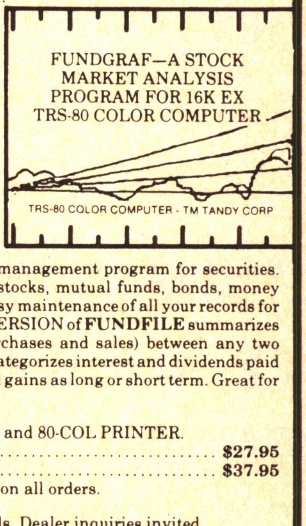

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Cribs, Nobs, Turnups And Heels — In Color

Mechanically, *Cribbage* by Aurora Computing is superb. It takes my $1,000 computer and turns it into a deck of cards and a cribbage board.

Actually it does quite a bit more — it keeps score of the hand and of each player's "peg" during most of the game. It would seem that this program is more difficult to use than a deck of cards.

At the start of the game you are asked if you want to play another player or in two teams. You are then asked for the names of the players, which the program uses to keep track of the game. The next request is for your choice of having the cards printed to the screen or the printer. The screen option displays your cards for a time and then clears — you either have to write them down or have a much better memory than mine.

The game is conducted "by the book" and players indicate their play with card numbers. The computer does the during-play counting. After the hand, the more complex post-play counting must be done by the players. (If you have never played cribbage, look up the rules in an encyclopedia or a *Hoyle's Book of Rules* — the complexity will amaze you.)

The skill of the person who wrote this program is evident in the screen displays and the impressive graphics. But, the documentation is poor, at best.

If you are a serious cribbage player and you would like a new approach to the game, it may be worth the price and the aggravation of the documentation — but it will never replace a deck of Bicycle playing cards and a peg-board.

(Aurora Computing, 49 Brookland Ave., Aurora, Ontario, Canada L4G 2H6, $14.95 tape)

— Glenn B. Knight

Scripture Quiz Package 'Helpful' To Youth

Quality Christian Software has continued issuing excellent Bible-oriented software with the latest offering being *3-Game Pack #3*.

This program's games are based on Bible study and they are well thought out, and nicely put together.

They would be excellent tools for the Bible class or a Sunday school. They also constitute a good drill for the Bible quiz members, if you have that activity in your church. At any rate, it is an opportunity to learn about the Scriptures in an easy and familiar way — the multiple choice quiz.

The *Sword Drill* program is a good way to sharpen your wits. CoCo picks out the Bible quotation and you must pick out the chapter and verse. It is a memory challenger. If you were wondering why it is called a *Sword Drill*, it is because St. Paul referred to the Bible as the "Sword of the spirit." (Eph. 6:17).

As with the other programs in this series, you set your own time limits — from a very brief instant to a longer period. This is what opens these programs to a wide range of ages. Even very young children can play with help, because there is ample time to think.

The second game on the tape is called *Who Did That?* Again, you get to choose the time limits but this time you are also asked to tell CoCo your name. All of these games give you the right answer and a beep if you miss or if time expires while you are still cogitating. You will get a congratulation message when you make a good score on the third game which is called *Bible Quotes #2*. The comments given after the game offer a goal for which the student may strive. This is a help to young people.

(Quality Christian Software, P.O. Box 1899, Duncan, OK 73533, 16K ECB tape $10.99)

— Howard Lee Ball

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10KEY: A Numeric Keypad For Your CoCo

10KEY is a utility program that turns a portion of the CoCo keyboard into a numeric keypad. This program is written in relocatable machine code and will run on BASIC and Extended BASIC CoCos. *10KEY* is delivered on tape and is accompanied by two other programs: *GEN* and *DEMO*. The *GEN* program allows you to generate a customized version of *10KEY*. *GEN* works only on Extended BASIC CoCos. The *DEMO* program creates a bar graph from numerical data you enter. *DEMO* works on all CoCos.

The *10KEY* program, as delivered, loads into the top end of 16K memory. To test the relocatability of *10KEY*, I loaded the program with a 16K offset. *10KEY* operated properly. Once *10KEY* is loaded and executed, engaging or disengaging the program is accomplished by pressing the down arrow key. Each time the down arrow is pressed a tone is sounded to indicate the status of *10KEY*. The *10KEY* program delivered on tape uses the following keys:

Key	7	stayed	7
Key	8	stayed	8
Key	9	stayed	9
Key	U	becomes	4
Key	I	becomes	5
Key	O	becomes	6
Key	J	becomes	1
Key	K	becomes	2
Key	L	becomes	3
Key	M	becomes	0

After *10KEY* is loaded, Extended BASIC users can save the program to disk or tape with the following statement: *(C)SAVEM"10KEY",16128,16339,16298* ENTER. I mention this because the start, stop, and execute addresses are not in the instruction booklet. I easily found these addresses by examining the *GEN* program listing.

After loading and running the *GEN* program you can design your own custom numeric keypad. To be completely different, I set up my keypad on the left-hand side of the keyboard.

Key	Z	became	0
Key	1	stayed	1
Key	2	stayed	2
Key	3	stayed	3
Key	Q	became	4
Key	W	became	5
Key	E	became	6
Key	A	became	7
Key	S	became	8
Key	D	became	9

The *GEN* program gives you the options of having key-clicks on: all the time, only when *10KEY* is engaged, or never. Using the *GEN* program, you can relocate the customized keypad to four areas of memory:

1) &H0600 (first graphics page for non-disk systems)
2) &H0E00 (first graphics page for disk systems)
3) &H3F00 (end of 16K)
4) &H7F00 (end of 32K)

I ran into one major problem in the *GEN* program. When I tried to save my custom keypad to the end of 32K, my CoCo locked up. I called program distributor Jay Hoggins. Sure enough, he found the problem. The *GEN* program does not protect the area where the keypad program is generated. A quick solution was to CLEAR *250,&H7EFF* on a 32K CoCo or CLEAR *250,&H3EFF* on a 16K CoCo before loading the *GEN* program. Jay is either going to add instructions to the program or modify the program to correct this problem. If you use the first graphics page to store your program, you cannot use any graphics.

GEN and *DEMO* can be saved to disk or tape using the *SAVE* and *CSAVE* commands respectively. The *10KEY* program cannot be saved on a Non-Extended BASIC CoCo because of the lack of a *CSAVEM* or *SAVEM* command. According to a letter I received, the company will provide a one-time custom *10KEY* program, at no cost, for Non-Extended BASIC users. This custom program must be requested.

Note: The *10KEY* program works only on BASIC and machine language programs that use the BASIC ROM input routine. You cannot input data with an *INKEY$* type command.

The instructions that accompany *10KEY* were adequate and clearly written. Following the instructions, I had *10KEY* operating quickly.

10KEY is an inexpensive program that can make moderate to heavy numeric data entry easier. If you are in the market for a numeric keypad, but can't afford the expensive hardware, *10KEY* may be what you are looking for.

(Color Connection Software, 1060 Buddlea Drive, Sandy, UT 84070, tape $17.95 plus $2 S/H)

— Gabriel Weaver

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Bjork Blocks Gets An 'F' For Fun

By now, I guess most of you RAINBOW readers who are students are back in school. Just to get you acclimated to the academic life, we are going to review *Bjork Blocks* by giving it a grade. We are going to give it an "F." Is that good, or bad? You can never understand these modern report cards. In the case of *Bjork Blocks* the "F" stands for fun. The "F" could also stand for functional. By way of Moreton Bay Software, and Steve Bjork, we now have one of the most user-friendly graphic utilities available for any personal computer.

Steve Bjork is, in my opinion, one of the premier programmers of the CoCo, with such credits as *Zaxxon* and the *Sands of Egypt*. The manual states "*Bjork Blocks* was originally developed by Steve Bjork for his own use in developing screens for the games he writes." With this program, you too could be an expert graphics designer, or game writer, in a flash.

What Does It Do?

The first thing you notice after loading the auto-executing program from tape is the menu selection procedure, or lack of it. The four menu options are selected by positioning a rectangular cursor over your choice with your joystick, or a mouse, and pressing the fire button. That's as complicated as it gets. The entire program is operated with one joystick.

The most complicated part of the program is understanding the difference between blocks and maps. The premise of the operation of *Bjork Blocks* is that most graphics data is actually repetitive. By defining a set of small 8 x 8 pixel "blocks" we can position these blocks anywhere on the screen, or "map" we wish. This concept allows storage of high resolution graphics with minimal memory usage. Only one block set can be resident in memory but you can have up to 10 maps.

The easiest way to explain this concept is to imagine that your joystick has a cursor that is eight pixels high and eight pixels wide. By touching your fire button you can capture the 8 x 8 block under the cursor. Moving the joystick control moves the cursor. Again by touching the fire button you can transfer the block that you captured to another part of the screen.

The manual states, "Each map is composed of 16 blocks horizontally and 24 blocks vertically. Thus one map is composed of 384 blocks. With a little imagination you can create an enormous number of different screens with the same block set."

One of the menu selections is "Convert a Picture." This feature converts an existing graphics screen to a block format. As a test I converted a picture from *GRAPHICOM*, another excellent graphics utility, to a binary file. *Bjork Blocks* converted the picture to a block format with about a

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If you want to use a *BjorkBlocks* created picture for games, programs, etc., a machine language utility is included in the manual.

Edit A Block

Several different block sets are included on the master tape. With these sets you can create all kinds of pictures. If you need more blocks to work with you can create them yourself. Each existing block, or new blocks, can be changed using the block editor.

After requesting "Edit a Block Set" from a menu, the resident block set is displayed on the screen. By positioning the 8 x 8 pixel cursor over the block you wish to edit, a simple touch of the fire button magnifies the block on a separate editing screen. Each pixel can be changed independently or an entire group of blocks with similar colors can be reversed. It works great and is easy to understand. After editing, place the block back in the set for use with the maps.

Three color sets are available for artists with fine tastes. One is an artifacted set of red, blue, black and white. This set was my favorite and I seldom used the other two.

Animation

Those users with 64K are offered a very unique feature. Animation is achieved by displaying screen image data stored in the upper 32K of a 64K computer. One example that is included with the program is a network of colored pipes. By changing the block data on the map animation is at your fingertips. The joystick acts as a speed control providing a dynamic effect. In the case of the colored pipes it appears that water is flowing through the system.

Using *Bjork Blocks* With Disk

Bjork Blocks requires 32K CoCo and one joystick. Animation is possible with 64K. The program is supplied on tape, but instructions are given to easily transfer the program, and the data, to disk. The 12-page manual is adequate but could have been better. Keep in mind that this is probably the most user friendly program I have ever seen for the CoCo.

I think *Bjork Blocks* will be enjoyed by all and should be considered necessary software for anyone interested in graphics. I can speak for my family of graphics experts that many hours of fun can be expected. Every day I see a new picture on the disk. For those of you with graphics interests, I will guarantee that you will not be disappointed.

(Moreton Bay Software, 316 Castillo St., Santa Barbara, CA 93101, 32/64K tape or disk $34.95)

— Dan Downard

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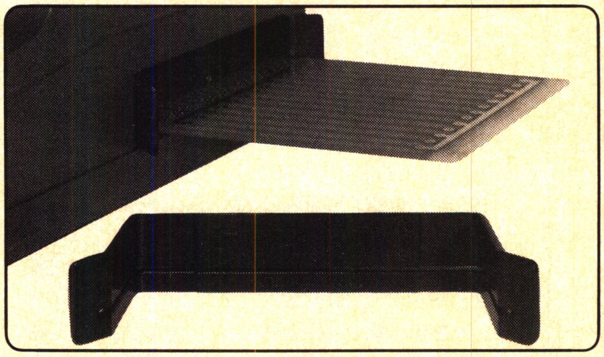

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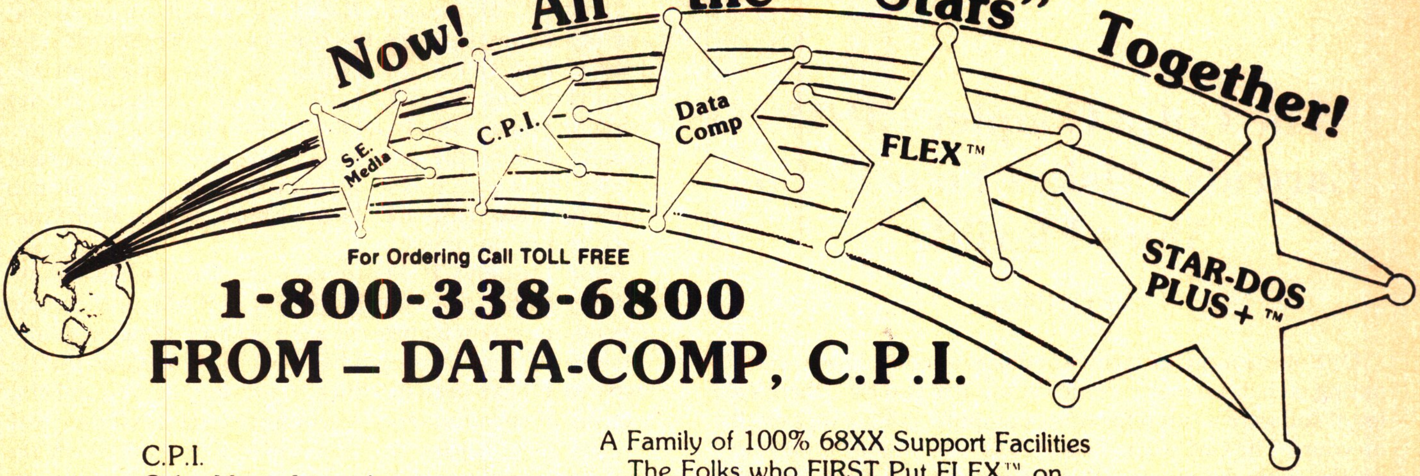

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The CoCo Coupler CP/M Cartridge Makes Your CoCo More Flexible

By Ed Ellers

One of the more unfortunate things about personal computing is that, no matter which computer you buy, there's a lot of software written for other computers that won't work on yours. The CoCo won't run *Lotus 1-2-3* or *DisplayWrite;* on the other hand, the IBM PCjr can't use *VIP Calc* or *Telewriter-64*, and neither of them can handle programs like *AppleWorks* and *MousePaint* that run on the Apple II.

Fortunately, computers are very flexible devices, and it's possible to make a computer do something entirely different from what it had been doing a moment before. The CoCo's ability to run programs designed for the FLEX and OS-9 operating systems, as well as those that run under Color BASIC, is the case in point.

When the programs you want to use run on a different microprocessor chip than the one your machine has, the solution is usually to get that other chip running on your machine in some way. Radio Shack's Model 16 adds a 68000 processor to the Z-80 that the Model II had, in order to use things like XENIX that require a 16-bit chip. There's a board called the Softcard that lets the Apple II use CP/M-based programs, and a product called *Quadlink* makes the IBM PC able to run Apple programs.

Wayne Technology's CoCo Coupler lets a 64K CoCo run programs written for the CP/M operating system, which is one of the most popular systems around and has a huge amount of software that runs on it. With the CoCo Coupler, most of this will run on the CoCo.

What is CP/M?

CP/M (Control Program for Microcomputers) is an operating system for computers that use the 8080, 8085 and Z-80 processors. (This is more precisely called CP/M-80; there are other versions such as CP/M-86 and CP/M-68K for other processors.) It has been around in various forms for about 11 years, and has become immensely popular among users of "80" type machines. The most recent version is CP/M 3.0 (also known as CP/M Plus, because of its added features), but the earlier 2.2 version (used with the CoCo Coupler) is by far the most common and still well-supported.

If you're familiar with OS-9 or FLEX, you already know what an operating system is; if not, I'll tell you that it is a collection of programs that, put very simply, make the computer work. An operating system like CP/M loads programs and executes them and has the routines that let the program you're running communicate with the outside world through the keyboard, display, printer and other devices. (The CoCo's own "operating system" is part of Color BASIC.) A program properly written for the CP/M will work on many different computers running literally from Altair to Zenith.

How Does It Work?

The CoCo Coupler makes the CoCo into a CP/M-based system with 60K of useful RAM (4K is used for the display and other things), using the CoCo's own keyboard, video display (with an exception I'll get to later), disk controller and drives and serial I/O port. It can use your existing printer if you are able to set it (usually by means of a switch) to not advance the paper automatically after a carriage return; this is exactly the opposite of what a CoCo printer should do, but many CP/M programs (such as *WordStar*) work best in this mode.

About the only CP/M programs that won't work with the Coupler are those that need a full 64K of RAM, or those that depend on certain features of a particular computer. (Some versions of certain programs, such as *WordStar* for the Osborne I, have been modified to prevent them from being used on other computers.) Anything else goes, assuming you can get it on a disk that the CoCo can read. With the *Multiform* package, CP/M for the CoCo can read over a dozen different formats; a skilled programmer could make it read even more. The CoCo can't read from 8" disks (without the proper drive and additional hardware), 3½" Sony disks (for the same reason), hard-sectored disks such as the ones used on the Heathkit and Zenith 8 and 89 systems, and disks written on an Apple II.

In actual CP/M operation, you plug the CoCo Coupler into the cartridge slot, plug your disk controller into the Coupler and power up the system. (The Coupler takes its power from the CoCo.) Instead of the usual messages, you see a screen asking you to press 'C' for CP/M or 'B' for BASIC. To start CP/M, insert the CP/M disk in drive zero and press 'C'. CP/M will load in and you'll shortly see a startup message and the prompt A>. In CP/M, the drives are called A:, B:, C: and D: instead of zero, one, two and three.

CP/M's relatively few commands are fairly logical. You use *DIR* to get a directory of the drive you are presently using, *ERA* and the filename to erase a file, and *TYPE* to send the contents of an ASCII file to the screen. There is *PIP*, a program that copies files; *ED*, a simple text editor; *ASM*, an 8080 assembler; *DDT*, a debugging tool, and other utilities from the standard utility package that comes with CP/M. To load and run a machine-language program, you just type its name; to run *BASIC.COM*, you just type BASIC. There is very little in the CoCo Coupler manual about CP/M commands; you would need a whole book to cover CP/M from start to finish, and rather than try to write one they chose to just tell what CP/M has and recommend that you get one of the many CP/M books on the market. (If you can find a CP/M text at your local library, it will tell you more about it than a review could.)

The one big problem that the CoCo has when running CP/M is the 32 x 16 screen. Nearly all CP/M programs are formatted for an 80 x 24 screen, since most CP/M-based systems (two notable exceptions are the Apple II and the Osborne I; both can be modified, though) have such a display. The best that Wayne Technology was able to do on the existing CoCo was to write a program called *VIDEO80* that creates an 80 x 24 display area and lets you move the 32 x 16 screen "window" around in it; as text is printed, the window moves to follow it. (This is similar to the way the Osborne I gets around its 52 x 24 screen limits.) There is a way out, but it costs some extra money; PNJ's *Word-Pak* gives the CoCo a true 80 x 24 display, and the CoCo Coupler has a driver program for it. Using the *Word-Pak* requires the

Multi-Pak Interface; you plug the CoCo Coupler into the computer (with its support flange removed), plug the Multi-Pak into the Coupler and plug the disk controller and the *Word-Pak* into the Multi-Pak. This is one of the stranger computer configurations, but it works well. You do need a good monitor for the *Word-Pak* video display, though. Once you start up CP/M, just type *WORDPAK* and the driver will load and run; display will switch to the *Word-Pak*, and you will have a full 80 x 24 display.

Although the manual only glosses over CP/M itself, it does tell how to use the CoCo Coupler and the programs that Wayne Technology supplies for it. The unit itself is fairly simple; it's a first-rate product and shouldn't cause any problems. The $250 price is rather steep, but remember that this includes the CP/M package from Digital Research which does not come cheap. (By comparison, Radio Shack sells CP/M Plus for the Model 4, which requires no hardware changes, for $149.) If you really want to use CP/M, this is still an economical way to do it; even counting the added cost of a *Word-Pak* and the Multi-Pak Interface (which you won't need if you can live with the CoCo's own display), it's a good deal cheaper than buying another machine like the Kaypro II or Zenith Z-90.

(Wayne Technology, Box 5196, Anaheim, CA 92804-1196, $250; CP/M licensed by Digital Research Inc.)

Disk-O-Tier: An Unusual Filing Device

There have probably been special cases and files for diskettes for as long as diskettes have been around. The Disk-O-Tier is the most unusual of any I've seen, and it works like a charm.

The Disk-O-Tier is simply a rack about 10 inches tall that holds as many as 11 disks; either the normal 5¼-inch disks used by the CoCo or the eight-inch disks used by many business systems. The disks are arranged in a stair-step fashion where any of them can be pulled out and put back easily. The top half of the diskette label is visible on all disks.

The Disk-O-Tier is not something that you would want to buy a quantity of to store all your disks in. It takes up much more space than a normal file box, but it's really good for the 10 or 20 disks you use most often. You can set one or two Disk-O-Tiers on the desk next to your system and have your diskettes available quickly. Overall, it is a very good idea.

(Evans Enterprises, c/o Joe Evans, 609 Applehill Dr., W. Carrollton, OH 45449; $9 plus $3 S/H for one, $18 plus $4 S/H for two)

— Ed Ellers

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All programs are on cassette, documented, and use 32K ECB PMODE 3 graphics. Reviews have been or will be published in this magazine.

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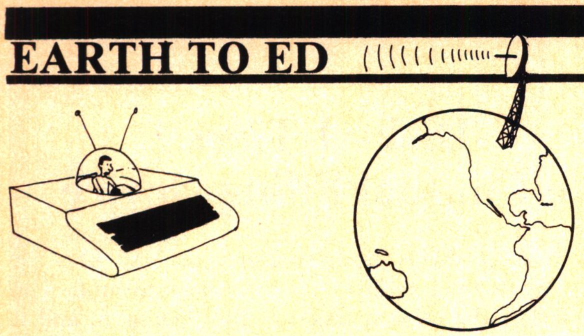

Maybe Your Degausser Is Falling Down On The Job

By Ed Ellers
Rainbow Technical Writer

- *After much consideration, I sold the TV which I used with my CoCo and purchased an Amdek Color-I Plus monitor. Trying hard to save a few dollars and not being afraid to open the computer up, I installed a homebrew video output modification. I powered up the CoCo and monitor to find the display quite unsatisfactory, so I twiddled with the CoCo's internal video level pot and all the external controls on the monitor, to no avail. I then installed Computerware's* Video Plus *monitor driver. I'm not sure whether the change is better or worse, but the colors are all wishy-washy and when the normal green background is used parts of the screen are blue. With the color control turned down so that the picture is almost black and white, all is well.*

Ray Preston
Rarotonga, Cook Islands

It's entirely possible that the picture tube in your monitor is magnetized, causing the electron beams to hit the wrong colors on the screen. Nearly all color TV sets and monitors have a special coil around the tube that demagnetizes ("degausses") it each time the set is turned on, but this is not intended for stubborn cases. If you have a bulk tape eraser, clear the area of all your tapes and disks and plug the eraser in through an extension cord. Hold the button down and move the eraser around the face of the tube; after you have covered the entire screen, back off a few feet before cutting off the eraser. If this doesn't clear up the problem, have your monitor checked out by a technician.

No 64K Yet

- *I have a CoCo 2 in which I have installed 64K RAM chips. The problem is that we cannot find the jumpers so I can use 64K, so my computer effectively has only 16K available. Radio Shack told me that they won't have the schematic diagram available until next year.*

Bill Benedetto
Wakefield, MA

The only thing you need to do is to solder across the two pads marked W1 next to the 6822 chip, roughly in the center of the board. As for the schematic, they were probably talking about the "Technical Reference Manual"; the present edition covers the older CoCo. The service manual definitely is available (their own service centers couldn't fix CoCo 2's without it). To get the service manual for any Tandy product, just ask the manager at your local Radio Shack to order it for you. The ordering code for computer products is MS260- followed by the last four digits of the model number (so 26-3001 would translate to MS260-3001).

Not-So-Diabolical Experiments

- *I recently modified my CoCo's joystick as described by Dane Weston's article "Unlock Your Joyports" (December 1983, Page 56). After trying the cadmium sulfide photocell as recommended in the article, everything appeared to be in order. In his article, Mr. Weston encouraged the readers to experiment, so I did just that. I wrote a program to graphically chart the joystick values. One thing led to another, and I had a friend clip the leads to the span of skin in between the fingers of his left hand. This produced a smooth and regular wave pattern that amazed both myself and my friend. We got similar results by pushing the clips into opposite sides of an apple and attaching them to a flower stem. We are truly baffled and thought perhaps someone could explain the phenomenon.*

Wayne Gordon
Seabrook, TX

Sounds to me like good old hum pickup. With all the electrical wiring around (not to mention the vertical sweep circuitry in your TV) there's a fairly strong 60 Hz electromagnetic field in the room, and the two wires leading to the clips pick up some of it; the flower and apple provide a relatively low-resistance path to complete the circuit, and your body not only does the same but picks up and conducts a great deal of current itself. (Touch the terminals of a tape head or the volume control on a battery-powered radio and you'll find out what I mean.) The "hum" is appearing as a nice smooth sine wave.

Gemini Revisited

- *I read your review of the Gemini-10X printer, and you mentioned a manual written by Valleyware Publishing. Can you tell me where I can get this manual, and how*

(Ed Ellers, a RAINBOW *and* PCM *staff member, is a self-confessed electronics fanatic whose other interests include science fiction.)*

much it costs?

Ding Villanueva
Hong Kong

The new version of the Gemini manual was written specifically for Star Micronics, and when you buy the 10X or 15X the dealer should give it to you free (it's sent to him separately, but at no extra charge). I don't know if this applies outside the United States.

The Search

• *Do you know where I can get a Votrax SC-01A voice synthesizer IC?*

John Caron
Hermitage, TN

Two sources are Spectrum Projects and Micro R.G.S.; both advertise in THE RAINBOW.

The Dialer with a Difference

• *I recently bought a Novation J-CAT modem, and the manual says that there is a way to perform automatic dialing with it and gives a short program listing for the Apple II. Is there a way to do this with the CoCo?*

Edward Donovan
Worcester, MA

It would be very difficult indeed. The J-CAT uses one of the "spare" RS-232 lines to key the dialing relay; the program listing you mention does all the needed timing. Unfortunately, the CoCo doesn't have any spare RS-232 output lines, so that route is closed. It might be possible to use a relay connected to the cassette remote plug to switch the CoCo's transmit line from the modem's transmit line to the dialing line; you could then write a program to switch between the two and send out the appropriate pulses.

Oh, Brother! Book II

• *Here are some additional hints for a patch to the* Color Disk Scripsit *program to use the Brother Correctronic-50 typewriter/printer.*

1) *LOADM"DOS"*
2) *Print the PEEK values for &HEBC, EBD and EBE. If they are equal to 247, 255 and 32 respectively then proceed. (If they aren't, this fix will not work.)*
3) *POKE &HEBC, &H8D:POKE &HEBD, 6:POKE &HEBE, &H5F*
4) *SAVEM"DOS" &HE41, &H1E9E, &H1050*

Ashok Basargekar
Orange, CA

Tandy's New Baby

• *Will software written to use printers such as Epson, Gemini, Okidata and the Radio Shack Line Printer VII and DMP-100 work on the new DMP-110?*

Marcus Boyd
Leander, TX

The DMP-110 uses Tandy's standard printer codes, so the features it has are accessed in the same way as on all their dot-matrix printers after the Line Printer VIII (except the DMP-100). The bit-image graphics are the same as on the LP VIII and DMP-100, but enlarged characters are accessed by *CHR$(27) CHR$(14)* instead of just *CHR$(14)* and canceled by *CHR$(27) CHR$(15)* instead of *CHR$(15)*. The LP VIII and DMP-100 will respond normally to the new codes, though. Programs written to use special features on Epson, Gemini or Okidata printers generally won't work with Radio Shack units.

More White and Gray

• *I have a CoCo 2, and I was told that to use the X-Pad with my computer, I need the Multi-Pak Interface. Do I need a gray or white interface? Will it work on my CoCo without modifications? Finally, can I then use the older (gray case) disk drive 0 and controller?*

James Foster
Modesto, CA

Either the gray or white Multi-Pak will work with no modifications; the only difference is the color. Also, the older disk system will work with the Multi-Pak on the CoCo 2.

Which CoCo?

• *Could you explain how I can see if my computer has a D, E or F board? I'm interested in installing 64K.*

Alexandre Maggioni
Lausanne, Switzerland

If the nameplate on your computer is centered, it's an F board; if it's set towards the left, it's either a C, D or E. To find out which of those three you have you'll need to remove the top and look at the board number near the cartridge slot; the letter on the end is the board version.

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All programs require a minimum of 32K and 1 disk drive but will take advantage of 64K and multiple drives. Each package features a hi-res 51 x 24 black on green screen. 16K versions available without hi-res screen. Specify 16K or 32K versions when ordering. Future integrated packages will include: Inventory Control, Sales Analysis, Accounts Payable.

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CORRECTIONS

In "Get Your Feet Wet With These Paddles" (August, Page 131) the author's address was left out. Please send inquiries to Helene M. LaBonville, 121 Camelot Drive, R.F.D. 5, Bedford, N.H. 03102.

In the series "Interfacing Your Own Circuits" (July, Page 138) and "Cooking With CoCo" (September, Page 78), the Radio Shack prototyping boards mentioned are no longer available. Whit Athey states that the Proto-CoCo board from PBJ, Box 813, North Bergen, N.J. 07047 is a suitable replacement.

In "The Crown of Merro" (February), Jeff Craig says that a line number is incorrect in Line 390 shown on Page 29. Here's the portion of the line to be corrected:

```
390 . . . PRINT "IT LOOKS LIKE THE
ONE THAT WAS STOLEN FROM ME.":
GOTO290 . . .
```

In "Roulette" (April, Page 25), Gerry Schecter advises us that a line should be added if you are using a CoCo with the new BASIC ROM chips. Here it is:

```
135 FOR G = 339 TO 344:POKE G,2
55:NEXT
```

In "Karrak" (February), two lines ran together in the listing on Page 104. Here they are:

```
3011 X=RND(3):IFX=1THENPRINT@416
,"IT MISSED ME":ELSEIFX=2PRINT@4
16,"IT HIT MY ARM":AG=AG-5:ELSEP
RINT@416,"IT HIT MY LEG":AG=AG-7

3014 IFAG<1THENPRINT@448,"KARRAK
 IS DEAD":FORX=1TO3000:NEXT:CLS:
END
```

In the hint "Simplified Saves" (August, Page 88), the first asterisk in Line 5 of the cassette version should be an equals sign.

In "The Trip" (August, Page 90), two lines in the program were too long to be listed properly. (When authors exceed the limits of the line buffer, even though the commands may be in the program, they will not completely LIST or LLIST. Authors should avoid these lengthy lines.) Here they are in their correct form:

```
163 X=RND(10000):CLS:PRINT"YOU C
OME TO THE SCENE OF AN      ACCID
ENT WHICH SEEMS TO HAVE     TAKEN
 PLACE ABOUT AN HOUR AGO. ACAR I
S STILL BURNING. NEAR IT ANARMY
TRUCK IS LYING ON ONE SIDE.DOORS
OPEN. IT IS FILLED WITH BAGS.":G
=G+X:Z1=2:Z2=3:AA=0:AB=0

164 PRINT"A FEW SOLDIERS ARE AWA
Y IN THE  FIELDS. LOOKING ON THE
 GROUND ATSOMETHING YOU DO NOT S
EE. YOU  GRAB ONE OF THE BAGS A
ND GO AWAYWITH IT. WHILE DRIVING
 BACK TO  THE MAIN ROAD. YOU OPE
N IT AND  FINDS THAT IT CONTAINS
"X:PRINT@448,"GOLD COINS":C8=1
```

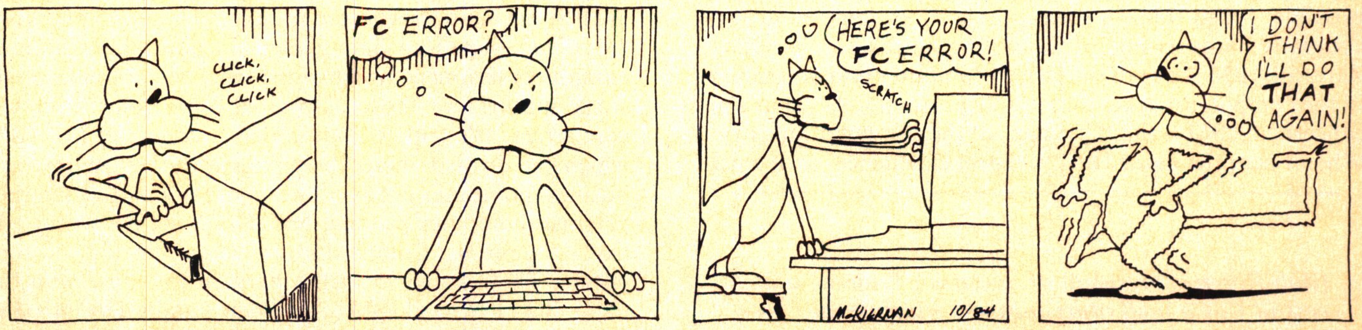
(Note: After you type these long lines, you will notice that they will *not LIST* to the screen or to a printout.)

In "Landlord" (July, Page 26), to run the program on a 16K Extended CoCo you will need to enter *POKE 25,6: NEW* to clear enough memory for the program to run; you will also need to unplug your disk controller if you have one.

In "Mail Mover (May, Page 75), the word "CHOISE" in Line 8120 should be "CHOICE"; also, Line 7170 should be deleted.

In "Trap That Error" (August, Page 61), if you are using a disk system with Disk BASIC 1.1, H. Allen Curtis suggests that you change the data item E4 in Line 100 to E5 and change E1 in Line 110 to E2. You will also need to change the checksum value in Line 70 from 36869 to 36871.

CoCo Cat


CLICK, CLICK, CLICK
FC ERROR?
HERE'S YOUR FC ERROR!
SCRATCH
McKIERNAN 10/84
I DON'T THINK I'LL DO THAT AGAIN!

My CoCo Is Not IBM Compatible

By Bob Rosen

My CoCo is *not* IBM PC compatible, and I'm glad. IBM compatibility seems to be the newest fad in the home computer field. Unfortunately, the thrust of this fad has been that if a computer isn't IBM compatible, it isn't worth buying or owning. I don't happen to share this view. I, for one, am a proud owner of a Radio Shack Color Computer which is *not* IBM PC compatible. Although this may not seem possible to those who rally around the IBM banner, I'm very happy with my CoCo. It does all I ask of it and more.

I have hopes that, like all fads, this one will eventually fade and people will return to their senses and realize that IBM is not the only company which can produce a quality computer.

IBM hardly invented the home computer. It was companies like Tandy, Apple and Commodore who pioneered the field. They are the ones who did the research and development and took the risks which lead to the current state of the art in home computers. IBM, the late-comer in the home computer market, followed the trail so bravely blazed by its competitors and usurped the whole market. The PC was built using the experience gained by the TRS-80, Apple, and others. Not that I blame IBM; it's good business to get in on a growing market with a competitive product as soon as possible. I also think it's acceptable to use an established company name as one of the selling points of a product. After all, IBM is one of the largest computer manufacturers in the computer market that it now possesses. As far as I'm concerned, IBM is the "Cadillac" of the computer industry. When I hear the name IBM, I expect excellence, or at least exceptional quality. However, this does not make a "Volkswagen" or a "Toyota" a bad buy.

When I read that IBM was about to offer a home computer, I expected it to revolutionize the market. I was rubbing my hands with glee and anticipating something real good when I heard that IBM was going to release a personal computer. I remember reading the announcement for the IBM PC and thinking, "IBM is going to do this right, and they're going to show everybody what a real home computer is!" I was expecting a computer that would make Apple, Commodore *and* Tandy look up and take notice.

The PC was very much a disappointment to me. It really offered nothing innovative or new. The use of a pseudo-16-bit processor was the only new thing about it (and it wasn't really new; the CoCo's 6809E has many 16-bit capabilities). They basically copied the features that made computers like the Apple popular. They put in slots like the Apple. They put in a detached keyboard like the TRS-80 Model II and provide a BASIC with color and graphics commands like the CoCo —all of these and more with only minor improvements over the originals.

In some cases, they missed the mark totally. The one thing that IBM did bring which was new to the home computer market was an air of respectability and legitimacy. Many Wall Street analysts who had thought of home computers as "toys" or "souped-up video games" are now taking the home computers seriously. Some of the most active stocks on the stock market are those associated with home computer companies. It's truly a shame that a company like IBM, which can do such incredible things with their mainstream business computer product line, chose not to do so in their personal computer product line. Don't get me wrong; the CoCo, Apple and Commodore are all extremely good computers. They are very much a bargain for those who buy them. But I expected IBM to set a new standard by introducing new and revolutionary ideas. Instead, they just came out

---

(Bob Rosen is president of Spectrum Projects, a successful CoCo mail order business which he has been running for two and a half years.)

with another "ho-hum" computer. My four-year-old Tandy TRS-80 Model I has many features which surpass the PC, not to mention the Apple and our good friend the CoCo. The IBM is just a rehash of old ideas with a little bit of extra memory thrown in for good measure.

All things considered, the IBM PC really isn't a very special computer. There are three reasons it has established the standard it has: those three little blue letters "IBM." If not for these, the IBM PC would've been another anonymous computer that fell ignored by the wayside, joining many others in the forgotten computer graveyard. Good or bad, any computer that IBM released for the home market was bound to be the yardstick other home computers would be measured against. Other computers would have to emulate or better the IBM PC in order to compete and survive. It's a shame the trend is to emulate and not to better the PC. With a few notable exceptions, like the new Apple Macintosh and Lisa or (to some extent) the Tandy Model 2000, most companies (like Compaq, TI, Sperry, Panasonic, Sanyo and even AT&T) have played it safe and introduced computers which follow the same pattern. I guess they're giving the people what they want. And until the people realize that they don't really want a PC, but would be better off with a CoCo or similar computer, that's all we'll see.

There is nothing truly innovative about the hardware, the BASIC or the DOS on the PC. I'll put my CoCo up against a PC any day! And, in fact, that's what we're going to do right now.

As shown by the plethora of PC clones (many of which offer more features for less money), it's obvious IBM failed to pioneer a new microcomputer technology. The technology needed to build the PC was available off-the-shelf, so the PC is not a great technological feat. Although they were among the first to use the 16-bit 8088, it's 16-bit for internal (arithmetic) functions only. It uses an 8-bit data path for I/O, just like the CoCo. (It's like moving a house in two sections.) The PC never realizes its full speed or potential with 16-bit processing and 8-bit I/O, and the addition of the 8087 math co-processor only offers a minor increase in useful speed. Luckily many of the imitators choose not to imitate this; several PC clones use the 8086, a true 16-bit processor in the same CPU family, and a few (like the Tandy Model 2000) even use the improved 80186.

Because the 16-bit internal structure of the 8088 allows the IBM PC to process 16-bits (two 8-bit bytes) at a time, the PC has a slight speed advantage over the CoCo's 8-bit 6809E. But only when the CoCo is running at standard speed! A CoCo running with the high-speed *POKE* is as fast as an IBM and as accurate. The mathematical accuracy of any computer is partially determined by the type of chip it is built with, but mostly with the software which directs the calculations. Most CPU (Central Processing Unit) chips like the Z-80 and the 6809E perform simple addition and subtraction, with software combining these functions to do multiplication and division. After all, multiplication is only multiple addition and division is only multiple subtraction! Although the 6809E is capable of 16-bit math, it is not a 16-bit chip knocked down to 8 bits — it's an 8-bit chip that thinks it's a 16-bit chip.

The IBM PC and the CoCo both use a standard Microsoft BASIC. So, at least while running BASIC, they should have the same mathematical accuracy. Some non-BASIC programs should be similar in mathematical accuracy as well. Many programmers prefer to use the already existing math routines which are contained in the BASIC ROMs as opposed to writing their own routines, which take time to write and debug. Hey, why reinvent the wheel every time you need to do some math?

As for disk operating systems, you use PC-DOS (better known as MS-DOS) on the IBM PC and Disk Extended Color BASIC on the CoCo. Disk Extended BASIC is much like IBM's BASICA (what others call GW-BASIC), but with many DOS commands built in. Personally, I find it much simpler to use the DOS on my CoCo than the DOS on my PC. There is no flipping back to the DOS command level every time I want to do a backup or copy. I just go to BASIC and type my command. I can also manipulate my disk drives easier from Disk Extended BASIC than I can on an IBM.

The only alternatives to PC-DOS on an IBM are CP/M using a Z-80 add-on card (might as well buy a CP/M-based system in the first place), Apple DOS 3.3 or ProDOS using an Apple II emulator card (same principle applies) or CP/M-86, which is basically the same as the original CP/M but recompiled for the 8086 family of processors. Well, I can run CP/M on the CoCo with a number of Z-80 add-on cartridges too. And IBM doesn't have operating systems like FLEX and OS-9. Although the PC can run a version of AT&T Bell Labs' highly touted UNIX, you have to be a programmer to use it effectively.

Under OS-9 or FLEX, I can run languages such as FORTH, C, COBOL, PASCAL, and many others, just like an IBM owner can! I can also run any of the other languages available under CP/M, too. There is also a large library of

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business software for FLEX and OS-9 which is as good as or better than comparable programs on the PC.

An IBM has 80 columns, and my CoCo has a 32-column screen, but I can buy *O-Pak* for OS-9 and get 64 by 16, or get 51 by 24 in FLEX automatically. I can also buy an 80-column board for my CoCo and get an 80-column display in Extended Color BASIC. Or, I can use something like 64 Column Mod I/III *Emulator* and get a 64 by 16 Hi-Res display by just using software.

My CoCo came with an RS-232 serial port, two joystick ports, color graphics capability and the ability to use a normal TV set. All of these are expensive options on the PC (although the PCjr has color graphics and joystick ports built in).

> ***"All in all, the IBM PC is, in my opinion, a very good computer, but much too expensive for the average home computer owner and not as advanced as the hype would lead you to believe. A Color Computer has been a much better value for my money . . ."***

Admittedly, the IBM standard keyboard is better than the CoCo standard keyboard, but IBM owners are still not very happy with it. The layout is slightly off and anyone used to a Selectric-type keyboard is easily thrown off by the non-standard placement of the SHIFT keys and such. Many IBM owners will spend $300 or more to replace their keyboard with one having a more standard layout. (IBM does sell the PC without a keyboard on special order, which brings the differential down somewhat.) For $70, I can replace my "Chiclet" keyboard with a full-stroke "Professional Keyboard" which has function keys as well. I really think $300 for an upgrade that I can get for my CoCo for $70 is way out of line. It costs an IBM owner as much as my CoCo to buy a replacement keyboard. It's just another reason I'm glad I own a CoCo. Even though I read the IBM magazines and "ooh" and "aah" at some of the products available for the IBM, I have learned not to be too envious. Some of the things I take for granted with my CoCo aren't even available on an IBM. It seems that those three little letters add at least 25 percent to the price of a product.

Under OS-9, a CoCo can function as a multi-user system. The IBM can't do this without an expensive add-on board. An IBM owner can't even think of using his system with just a cassette recorder in any real way, because hardly any PC software is sold on tape (some PCjr packages are sold on tape or more often in cartridges, but most are still sold on disk). I would say a good many of you reading this are getting by just fine with cassette systems, and probably will never need to get disk (get it anyway and enjoy the speed!).

These companies that make IBM clones are really doing nothing special, either. These lower-priced compatible computers are not as great a deal as they seem. Compare the base price of a clone to the real McCoy and they seem to be a great deal. The IBM should be selling at the price these clones are. The companies that make these clones are selling a product for a price which is a realistic reflection of its production cost. The name IBM seems to add quite a bit to the price of any product the name is added to. The IBM graphics printer is an Epson MX-80. IBM's price is $699, although you can get an MX-80 or the newer RX-80 from mail-order houses for around $300. To even run a printer on an IBM PC you have to buy a $100 parallel printer adapter (unless you forgo color and graphics). I can run a serial printer direct on a CoCo, or use a parallel printer with an optional serial to parallel converter cable.

The main issue for me is price and performance, and as I have been pointing out, owning the IBM is a very expensive proposition indeed. Let's do a couple of price comparisons: A 64K CoCo without any other goodies but ready to hook up to a color TV set, currently costs $259.95. A 64K PCjr, with roughly the same expansion capabilities (but able to use only IBM's thermal printer without adding an adapter) costs $599 plus $30 for the TV "connector cable" package. Going upwards, a 64K CoCo with two double-sided disk drives and a color monitor can be had for about $1100; a similarly equipped PC would cost nearly $3500. This isn't even including a printer, or a modem, or any of a number of other options that make a computer system usable. Owning a PC can be a very expensive proposition. The CoCo is well within the range of most families and hobbyists. The only important difference is that the PC can be expanded to 640K, and has those three little letters "IBM" on it.

Okay, a CoCo can only go up to 64K, but the BASIC on the IBM can only use 64K no matter how much memory there is in the computer, same as the CoCo. No advantage there. The only programs on the IBM that use all the available memory are spreadsheets such as *VisiCalc*, *SuperCalc*, etc., or word processors such as *Electric Pencil, Multimate,* and *WordStar,* also database managers like *DB Master, dBase II,* and others.

It's only *convenient* to have more than 64K for these types of programs, not *necessary*. The extra memory just allows you to have larger spreadsheets, documents or more items in a database. But to be honest, using these types of applications in a home environment, I don't need that much memory. I've been getting along fine with *Telewriter-64* and *Elite*Calc* — all running in my 64K CoCo. I may have to work a little slower than an IBM owner, but it's still many times faster and more accurate than performing the same operations by hand.

All in all, the IBM PC is, in my opinion, a very good computer, but much too expensive for the average home computer owner and not as advanced as the hype would lead you to believe. A Color Computer has been a much better value for my money and will probably be a better value for people shopping for a home computer, too. The CoCo may not be for everyone, but mine serves me well and, after all, what better criteria is there to judge a computer by?

My CoCo isn't PC compatible, and I'm not sorry at all.

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It's Time To Assemble 'Round the Ol' CoCo

A beginner's assembly language tutorial column

By R. Bartly Betts
Rainbow Contributing Editor
with Programs by Chris Bone

I understand that some of you didn't do last month's assignment and study your editor/assembler manual. Well, for punishment I have put a hex on this month's program listing. Until you complete the assignment, the program won't work for you . . . and it's a pretty nifty program, so shape up.

I, too, hate studying manuals. Instead of taking 15 minutes to read directions and learn how to run a program or hook up a gadget, I flounder ahead on my own. An hour later, when it doesn't work, I start reading the manual. Sometimes I even find that I haven't destroyed the program or gadget and, when I know what I am doing, it finally works.

Why am I telling you this? Because I haven't learned my lesson and foolishly think everyone else feels the same way. While I'm not suggesting you throw away your manual, I do feel it's time to forge ahead and write assembly language programs. I don't mean copying someone else's, but writing your own . . . it's time for the real thing.

(Bartly Betts is a former reporter and magazine editor now operating a retail store and custom leather shop in Brooks, Alberta, Canada. He has owned and operated a Color Computer for over three years and is presently taking an electronics and computer course by correspondence. Chris Bone is a college computer science major and has been programming for more than three years. He averages between six and nine hours a day on the CoCo.)

A Spoon For Your Ice Cream

So, fire up your computer, then load and execute your editor/assembler. At the "*" prompt, press 'Z' ENTER to get into the ZBUG mode. At the ZBUG prompt (#), press 'R' ENTER. The screen shows a display similar to this:

```
A=00      B = 00     DP = 00   CC = 00
X = 000   Y = 0000   U = 0000   S = 3977
PC = 0000
```

What you see are the values contained in your computer's registers.

In assembly language, registers are important. They are the spoon for your ice cream, the disk with your disk drive, the gas tank in your car. Nearly everything you ask your computer to do is accomplished with the aid of one or more registers.

While the registers are actually memory locations that can contain eight or 16 bytes of information, they are located in the CPU (Central Processing Unit) rather than in RAM (Random Assess Memory) or ROM (Read Only Memory). This means that they are fast at manipulating data.

In the Color Computer, the CPU is the 6809E chip. It controls what your computer does or is capable of doing. A computer is no better than its CPU and the 6809E is a good one.

Examining the CPU registers helps you understand what a program is doing and, if there are problems, where those problems occur. If you do nothing but turn your computer on, then load and execute *EDTASM+*, most of the registers will contain a value of zero, as shown in the previous example.

The Hex Paycheck

If you did your Hex homework in the first column, you will be glad to know it is time for the payoff. Registers are displayed in Hex values. Despite what others may say, life in assembly language just isn't worthwhile unless you know Hex.

You should also notice that registers X, Y and U hold two bytes (16 bits) while registers A and B hold only one byte (eight bits). It takes two hexadecimal characters to represent each eight bits.) You'll be learning a lot more about this later, but the 6809's ability to do 16-bit operations in an eight-bit CPU is what sets it apart from the crowd. It will also make your assembly language programming a much lighter task.

Using the registers in an assembly language program is easy, so let's do it. If you are still in ZBUG, press 'E' ENTER, to return to the editor. Now type 'I'[10] ENTER to get into the insert mode, beginning at Line 10. Now type in the short program below.

```
0010  START  LDA   #10
0020         LDB   #10
0030         LDX   #10
0040         LDY   #10
0050         LDU   #10
0060         SWI
0070         END
```

As you probably know or guess, the program doesn't do much except illustrate the loading of registers A, B, X, Y, and U with the decimal value of 10. You can see for yourself by assembling the program and running it. Press BREAK to exit the input mode and then, in the edit mode (at the "*" prompt), type A/IM/WE ENTER. The program should be assembled in memory with no errors. If there are any, do what editing is necessary.

Now press 'Z' to get back to ZBUG and then press 'R' ENTER to look at the registers. They now should look like this:

```
A = 0A     B = 0A     CC = 80 = E
X = 000A  Y = 000A  U = 000A  S = 3977
PC = 3A63
```

It's A Hex Of A Life

Don't worry if all of the registers are not the same. A, B, X, Y, and U, should all show a value of decimal 10, however. If, on the other hand, you are confused because your show a value of 0A, then what can I say but, "aren't you sorry you didn't study the registers first lesson?" But, because I have a heart, I'll tell you that decimal 10 is 0A in Hex.

There is one other register that needs explaining. Actually, it isn't a new register, it is the product of two of the registers already mentioned. The D register is a 16-bit register that is formed by combining the values of register A and register B. It is a very handy innovation as you will see in the future. Naturally, when you are using the D register, you cannot use register A or register B for any conflicting operations.

To see how the D register works, type in these lines:

```
0010  START  LDD   #6000
0020         SWI
0030         END
```

You will never see a shorter program. It does the job, however. Assemble it before you enter ZBUG. Type *GSTART* ENTER to execute the program; then press 'R' ENTER to display the registers. Now try to locate the value of 6000 decimal that should be in register D. If you are having trouble, remember that register D is a combination of registers A and B and that the value will be in Hex. The value in register A should be $17, and the value in register B should be $70. Put together, they are $1770 in Hex. If you convert $1770 to decimal, the result is 6000.

NOTE: From now on, I will represent Hex numbers by preceding them with a "$" sign, in the same manner you must enter them in EDTASM+ *assembly programs.*

Counting On ZBUG

If you did study your *EDTASM+* manual, you will already know that there is an easy way to convert Hex, decimal or octal numbers back and forth. If you haven't tried it, go to ZBUG and type [0][10] ENTER. This tells ZBUG that you want values displayed in decimal, or base 10. Now type 1710=, and immediately the value of 6000 will be displayed. To get back to Hex, type [0][16] ENTER. Use the same procedure to convert in octal, or base eight if the need arises. There are several other ZBUG calculation features and, if you have not done so, it would be beneficial to review Chapter 6 in the *EDTASM+* manual. Knowing how to use the ZBUG calculator will prove useful in the future. But don't get mad because I made you learn to do the conversions the hard way. It isn't always easy or convenient to call up the ZBUG operation when you need a simple conversion or two.

> ***"The D register is a 16-bit register that is formed by combining the values of register A and register B. It is a very handy innovation as you will see in the future."***

What the #$,+ Does It Mean?

If you refer to the previous examples of source code, you will notice that the numbers loaded into the registers were preceded by the symbol "#." In the future I will discuss this and other symbols more fully, but for now the following information may help you.

The "#" symbol tells your assembler that the number following it is an actual value, and not a memory location. If the "#" symbol is omitted, the assembler concludes that the number refers to a memory address.

Preceding the number with a "$" symbol tells the assembler that the value is in Hex. The comma lets you use a value in a register as a memory address. Placing a plus sign after a register increments the register by one. Placing a minus sign decrements the register by one. Following are some examples:

```
0010        LDA   ,B Loads the val-
                  ue of register B
                  into register A
0020        LDA   ,B+ Loads the val-
                  ue of B into A
                  and increments B
                  by 1
0030        LDA   #10 Loads deci-
                  mal 10 into regis-
                  ter A
0040        LDA   #$10 Loads Hex
                  10 into register A
0050        LDA   $10 Loads regis-
                  ter A with the val-
                  ue contained in
                  memory location
                  $10
```

The Value Of Labels

There is one last item to cover this month before giving you your next assignment. That has to do with the use of labels. Labels can be used in assembly language to represent memory locations or values as in the following examples:

```
0010 STARTLDX  #$400 Load X reg-
               ister with Hex 400
0020 LOOP  LDA ,X+ Load A with
               the value in mem-
               ory location point-
               ed to by register
```

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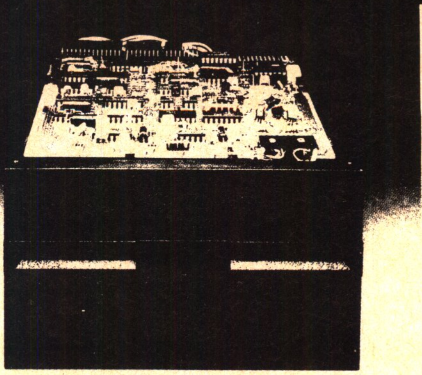

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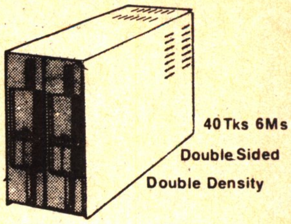

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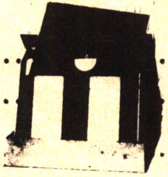

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```
                  X, increment X
0030        CMPA #65 Compare reg-
                  ister A with 65
0040        BEQ   END If equal,
                  branch to END —
                  program ends
0050        CMPX #$600 Compare
                  value in X with end
                  of screen
0060        BNE   LOOP If not at end
                  of screen look at
                  next location
0070 END    SWI   Program ends
                  here
0080        END
```

This program begins looking for a value of 65 (the character A in ASCII) at memory location $400. If that location does not contain 65, the program looks at the next location. This will continue until a value of 65 is found or the end of the screen is reached ($600) and the program ends. Labels were used in three lines. In Line 0010, START is used to indicate where the program begins. START points to the actual memory address. Thus, you can type *GSTART* in ZBUG and execute your assembled program.

The second label, LOOP, will point to the first line in the search routine. Thus, Line 0050 only needs to indicate a branch to LOOP to repeat the search pattern.

The third label, END, is used in the same way, to allow the program to stop when register X contains $600. BEQ is the instruction code for Branch On Equal. In this case it means branch to the memory location represented by the label "END" if X=$600.

To test the program, enter and assemble it. *GOTO* ZBUG and type *GSTART* ENTER. Reverse asterisks should replace the letter A and ZBUG should report "BREAK @ END." Now press 'R' to look at the registers. Register X should contain $600.

All of this leads up to the assignment for this month. Using your editor/assembler manual and the information in this column, enlarge on the above program to print alpha characters on the video screen (memory location $E400), search the screen memory for the "A" character and replace it with an asterisk (which has an ASCII value of 42).

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If you like, send a copy of your solution to me on a disk or tape, and if you have the best code, I will return your submission with a couple of neat programs that I have in stock. I'll also give your solution and your name prime time display in a future column. Be sure to supply a stamped, self-addressed envelope, if you want your disk or tape back. My budget wouldn't allow me to pick up the tab on all of the responses. If you are not a beginner, please wait for a tougher job. I will try and give some assignments in the future that will test the mettle of those of you with more experience.

And Now . . . Your Official Byte Master Badge And Secret Code Ring

Next month you will learn more about registers and codes and how to use them. We will also talk about how to use machine language routines with BASIC programs and how to use your BASIC's built-in routines. You have made giant strides forward this month and, when you complete the assign-

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ment, you join the computer-user elite, the few who call themselves assembly language programmers. (Sorry, I don't really have a "Byte Master" badge and secret code ring to send you.)

Reveal All With *SCANDAL*

But, as promised from the beginning, Chris has written a great machine language program for this month that will search through your BASIC programs for any specified string. You can use this as a cross reference or as a global search utility. To use the program, you will have to enter it with your editor/assembler and assemble it to disk or tape with the filename of *SCAN/BIN*. See your manual or past "Byte Master" columns for information on how to do this.

Now, if you have a BASIC program loaded and wish to find out what lines contain the string "HELLO," all you have to do is load *SCAN* and initialize it by typing *EXEC &H7FAC* ENTER for the 32K version or *EXEC &H3FAC* for the 16K version. Then type *EXEC: HELLO. SCANDAL* (that's the program's full name) and it will print out every line number that contains "HELLO." The routine can be used any number of times by repeating the procedure of typing *EXEC:* followed by the string or command you wish to find.

Why name the program *SCANDAL*? Well, when Chris wrote the program, he named it *"SCANNER FOR BASIC."* He doesn't know I renamed it yet, but when I tried to shorten it, *SCANFB* just didn't sound romantic. I decided that *SCAN DA LINES* sounded much better and shortened nicely to *SCANDAL*. If I have to write the program on my own next month, you'll know what Chris thought of the name change.

The program listing is given below. It is well commented and it should not be too hard to follow the main points. If you are not far enough along to understand all of the program yet, don't worry. Just use your editor/assembler to enter and assemble it. Then enjoy a fast search of any BASIC program. As well as the comments with the program, we have tried to provide an outline of the program flow which should be of help to you. All of the concepts covered in this lesson are used in the program plus a few more. Especially try to follow how the data is transferred and manipulated through the registers.

The Program

To load the program after it is saved, type: *"CLEAR 1,&H7FAB:CLEAR 300 :LOADM"SCAN"* for the 32K version or type: *"CLEAR 1,&H3FAC:CLEAR 300:LOADM"SCAN"* for the 16K version. If you are using cassette, type *CLOADM* instead of *LOADM*.

To use the program, type: *EXEC &H7FAC* to initialize *SCANDAL*. After that you can use the routine as often as you wish by typing: *EXEC:* followed by the searchname.

For example, if you wish to find the lines which contain "A$" type: *EXEC :A$* and the numbers of all the lines which contain A$ will be displayed.

The program also allows a wild card. A wild card is a symbol that can be used to represent any other character or characters. For instance, if you wish to search for all *GOTO 10* and *GOSUB 10* commands in a program, you can type: *EXEC:GO<backslash> 10*. The backslash (formed by typing SHIFT CLEAR) is

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a wild card and represents any letters that follow *GO*, in this case *TO* and *SUB*, in order to find the *GOTO* as well as the *GOSUB* commands.

How It Works

In BASIC, each line starts with two bytes that point to the starting address of the next BASIC line. The pointers of the last line of a program point to zero. You can obtain the line number by using the third and fourth bytes in the following calculation:

Byte #1 * 256 + Byte #2 = the line number

The BASIC line begins with the fifth byte. BASIC keywords and commands are in tokenized form. That is, a BASIC command, like *PRINT*, is represented by a one- or two-byte token value, rather than the actual word. To mark the end of the line, a zero is added. *SCANDAL* uses the above information to work its way through the BASIC program, going from one line to the next, without becoming lost.

Memory location $19 (decimal 25) contains the location of the first line of BASIC. This is used to get the program started. Memory location $A6 (decimal 166) contains the parse address which indicates where the computer was looking when you typed *EXEC:searchname*. When the program starts this pointer will be directed to the colon between *EXEC* and the searchname. The first job of *SCANDAL* is to skip the colon and read the target string.

The pointer to the target string is saved into the label *STRNG* and will be there whenever needed. Next, register U is set to point to the start of the first line of BASIC and *SCANDAL* launches into the main program loop.

The main loop has three jobs: 1) to save the start of the next line; 2) to compare the target string to the current line; and 3) to provide the correct output for the current line.

Job 1) Save the start of the current line in *LINE*. Get start of the next line. Put the next line pointer on the stack.

Job 2) Begin four bytes from the start of the line and, proceeding character by character, repeatedly go through the line to see if the target string is there. To do this, use an offset of four.

a) Save current offset, X=start of target Y=start of line+offset. If byte at Y=0 then End Of Line and the string was not found.

b) Get byte from target. If it is zero then success. If next byte to compare is zero then the search has failed. If the byte for target = the byte from BASIC then loop back to step b.

c) If search failed at this offset, add one to offset and try again.

Job 3) If it was a success, then output the line number and a space, else do nothing.

END OF MAIN LOOP: Skip the copy of the offset on the stack and get the pointer to the new next line. If the pointer is zero, go to Job 1.

END OF TASK: Print a carriage return to make a neat looking output. Get the start of the keyboard buffer. Zero the first three bytes and save $2DC as the parse pointer. Return to BASIC.

EXIT: The computer goes to parse the next character, sees that it is a zero so dumps out to the OK prompt and thus avoids an ?SN Error.

The listing:

(Type in either Line 10 or 11 depending on the memory you have, but do not type in both lines.)

```
00010       ORG   $7FAC *32K START USE THIS LINE FOR A 32K MACHINE
00011       ORG   $3FAC *16K START USE THIS LINE FOR A 16K MACHINE
00020 START LDX   $A6 *PARSE POINTER (IN KBRD BUFFER)
00030       LEAX  1,X    *SKIP DIVIDING COLON
00040       STX   $A6    *SAVE TARGET STRING POINTER
00050       LDU   $19    *START OF BASIC PROGRAM STORAGE
00060       BEQ   QUIT   *IF NO PROGRAM THEN QUIT
00070 LOOP  PSHS  U      *SAVE AS LOC OF LINE TO SCAN
00080       LDD   #4     *ACTUAL BASIC STARTS 4 BYTES INTO LINE
00090 TLOOP PSHS  A,B    *SAVE CURRENT OFFSET
00100       LDX   $A6    *GET START OF TARGET STRING
00110       LDY   2,S    *GET START OF BASIC LINE
00120       LEAY  D,Y    *ADD OFFSET INTO LINE
00130 TEST  LDA   ,X+    *GET BYTE OF TARGET STRING
00140       BEQ   HIT    *IF IT IS ZERO THEN WE HAVE A MATCH
00150       TST   ,Y     *IS THE NEXT BYTE OF LINE ZERO (END OF LINE)
00160       BEQ   NEXTL  *IF SO SET UP THE NEXT LINE
00170       CMPA  ,Y+    *IS THE TARGET BYTE = STORED BYTE
00180       BEQ   TEST   *IF SO GOTO CHECK MORE OF STRING
00190       CMPA  #$5C   *IS THE TARGET BYTE A WILD CARD
00200       BEQ   TEST   *IF SO GOTO CHECK MORE OF STRING
00210 NOHIT PULS  A,B    *RETREIVE CURRENT OFFSET
00220       ADDD  #$1    *BUMP BY ONE
00230       BRA   TLOOP  *GO COMPARE FROM NEW OFFSET
00240 HIT   LDX   2,S    *GET START OF LINE
00250       LDD   2,X    *GET LINE NUMBER OF THAT LINE
00260       JSR   $BDCC  *OUTPUT THE LINE NUMBER
00270       LDA   #$20   *GET ASC OF SPACE INTO REG A
00280       JSR   [$A002]*PRINT CHR$(A)
00290 NEXTL PULS  A,B,U  *SKIP OFFSET AND GET LINE POINTER
00300       LDU   ,U     *GET NEXT LINE POINTER
00310       BNE   LOOP   *IF NEXT LINE PNTR<>0 THEN CHECK NEXT LINE
00320 QUIT  LDA   #$0D   *GET ASC OR CR INTO REG A
00330       JSR   [$A002]*PRINT CHR$(A)
00340       LDX   #$2DC  *GET START OF KBRD BUFFER
00350       CLR   ,X     *SET FIRST BYTE OF KEYBRD BUFFER TO ZERO
00360       CLR   1,X    *AND THE SECOND BYTE
00370       CLR   2,X    *AND THE THIRD
00380       STX   $A6    *SAVE START OF BUFFER AS PARSE POINTER
00390       RTS          *RETURN TO BASIC
00400       END
```

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Creating the Rainbow Checkbook

By Richard White
Rainbow Contributing Editor

Last month we started developing a program called *Rainbow Checkbook* which will replace a program I am currently using that does not automatically provide for reconciling the checkbook balance with the bank balance. Well, this new one will do that and provide printed reports. Most of last month's discussion dealt with getting started, the planning phases and the decisions needed in order to properly structure the program. One important piece is the functional specification which describes what you expect the program to do. Here is the one we considered last month.

Functional Specifications

1) Be able to enter, edit and save checkbook entries.
2) Be able to scroll up or down through the file using the arrow keys.
3) Make needed functions available from the appropriate workscreen without exiting to a menu.
4) Be able to edit a record, delete it or insert a new record,
5) Have a routine to start a new file from scratch.
6) Be able to strip cleared items from the current file to an archive file after reconciliation with the bank statement.
7) Calculate a bank balance based on cleared items only for comparision with the balance on the bank statement. Corrections to cleared items must update the calculated bank balance. The calculated balance should duplicate that on the bank statement when all items are correctly entered and cleared.
8) Print a hard-copy report showing all cleared transactions and a bank balance reconciliation. This will include summations of deposits, checks and adjustments. Adjustments will include all non-deposit and non-check transactions including account charges, interest earned and check charges.
9) Support cassette and disk files.
10) Operate in a 16K Extended or Disk BASIC machine.

(Richard White has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the author of the TIMS *database management program.)*

From this description, the program modules needed can be defined and blocks of lines assigned. I follow certain standards. Subroutines used by more than one module and some frequently used by only one module go at the front. Thereafter, functions are assigned to 100 line blocks. I expect to use line spacing of two or even one to make things fit. Initialization routines that are executed only once go at the end of the program. Accordingly, the following assignments were made for *Rainbow Checkbook.*

Lines	Function
1-9	Most frequently used sub-routines
10-99	Other subroutines
100-199	Enter items
200-299	Edit records and update balances
400-499	Strip cleared items to make updated current file
600-699	Print report
900-999	Tape and disk I/O
2000-2099	Initialization
2100-2199	Make new file
10000	Save program routine
10100	*PCLEAR 1* routine

Last month we covered initialization and the make-new-file routine up to the data entry point. Subroutines called up to that point were discussed. If you are just now joining us and want to enter the program, I suggest you enter the lines below now. Those who have typed along this far, note that quotes have been added after *DAVCESLNB* in Line 2050 and correct your file.

```
0 GOTO10100
10100 PCLEAR1:GOTO2000
2000 CLEAR3763:DIMA$(142),A(142,1)
2050 RC$="RAINBOW CHECKBOOK":SS$="##,###.##":
     SN$="%          %   NOTE:":CR=1:LR=1:
     IS$="DAVCESLNB"+CHR$(10):S4$="%  %":
     CS$="OUTSTD":A$(0)=" $ $ $FIRST ENTRY  BELOW"
2100 CLS:PRINT@8,RC$:PRINT@42,"RICHARD
     WHITE":PRINT@76,"(C) 1984":PRINT@200,"lOAD
     FILE":PRINT@264,"nEW FILE":PRINT@328,"";:
     GOSUB1
2110 IFI$="L"THEN950ELSEIFI$<>"N"THEN2110

1 PRINTCHR$(191);:I$=INKEY$:IFI$=""THENFORX=0TO5:
 NEXT:PRINTCHR$(8);:GOTO1ELSEPRINTCHR$(8);:RETURN

38 A$(CR)=CC$+"$"+CD$+"$"+LEFT$(CS$,1)+"$"+CN$:
   A(CR,0)=CA:A(CR,1)=CB:RETURN

2120 CLS:GOSUB50:PRINT:PRINT:PRINT"ENTER LAST
     BANK STATEMENT       BALANCE ";:
     LINEINPUTI$:BB=VAL(I$):
     PRINT@128,STRING$(64,32): GOSUB52:GOSUB54:
     GOSUB58

 50 PRINT@8,RC$,"ITEM  DATE     AMOUNT   BALANCE":
    RETURN
 52 PRINT@352,"LAST BANK BALANCE ";:PRINTUSINGSS$;
    BB:RETURN
 54 PRINT@384,"<ENTER> =NEXT CHECK #",
    "1ST DIGIT STARTS NEW # SERIES":RETURN
 56 PRINT@448,"dEPOSIT aDJUSTMENT vOID cLEARED
    eDIT sAVE lOAD nEW MONTH "CHR$(94)"'S";:
    RETURN
 58 PRINT@448,"dEPOSIT aDJUSTMENT vOID","eDIT sAVE
    "CHR$(94)"'S";:RETURN

 2130 PRINT@320,"ENTER OUTSTANDING ITEMS       ";:
      PO=224

 10000 SAVE"RNBWCKBK" (For disk users. Tape users
                      use code below.)

 10000 INPUT"WANT TO RUN PAST LEADER";I$:
       IFI$="Y"THEN MOTORON:FORX=1TO6000:NEXT
 10010 FORC=1TO2:CSAVE"RNBWCKBK":MOTORON:
       FORX=1TO600:NEXT:NEXT:MOTOROFF
```

The subroutines 50, 52, 54 and 58 are called by Lines 2120 and 2130 to print a workscreen with a header, prompts and messages. Here comes the action.

```
2140 PRINT@PO,"";:GOSUB1:VI=VAL(I$):IFFG=0
     AND(VI>0ORI$=CHR$(13))GOSUB60:GOTO2140
```

In Line 2140 the *PRINT@PO," "* moves the printing position to 224 defined in Line 2130. This is the start of Line 8 on the screen. *GOSUB1* sends the program to the *INKEY$* subroutine that prints its own cursor at 224 while waiting a key input. Input may be a carriage return to continue with the next check in sequence, a digit to start a new check sequence or a letter or arrow to initiate a different input or function. *VI=VAL(I$)* converts the character to a number if it is a digit or a zero if it is anything else.

Now things are getting more complicated. When we scroll back or forth through the database, we need to prevent inadvertent data entry on top of existing records. *FG* is a flag that is set to 1 when the scrolling back is started. This fails the first test of the *IF* preventing access to the check entry subroutines. Access is only allowed if a digit or carriage return is entered. In programs like this each operation must be user proofed. It is too easy to make a mistake.

If *FG=0*, the first test is met and *VI* is checked for greater than 0. Alternately, *I$* may contain a carriage return, *CHR$(13)*. *IF* either test is met, control is transferred to the subroutine in Line 60. Note, there is no *THEN*. *IF . . . GOSUB* and *IF . . . GOTO* are acceptable alternates to *IF . . . THEN,* save a byte over *IF . . . THENGOSUB* and should be easier to read.

```
60 GOSUB22:GOSUB30:GOSUB37:GOSUB40:RETURN

22 IFI$=CHR$(13)THENCC=CC+1:CC$=STR$(CC):
   CC$=RIGHT$(CC$,LEN(CC$)-1):
   PRINT@224,USINGS4$;CC$:RETURN
```

Line 60 simply calls four subroutines in order and we will take them in order. Line 22 tests for the carriage return. If *I$=CHR$(13)* then *CC*, a variable carrying the current check number is incremented and then converted to a string. *STR$(CC)* puts a space before the characters when it makes the string. The code *CC$=RIGHT$(CC$,LEN (CC$)-1)* gets the right portion of the string containing the characters leaving the left-hand space behind. The program is designed to print check numbers up to 9999 using a four character *PRINTUSING* format string. This will only work for four character numbers when the space is stripped off. Next comes the code to print the number at the start of Line 8 and the *RETURN*.

```
24 IFVI>0THENPRINTUSING"#";VI;:LINEINPUTI$:
   CC$=STR$(VI)+I$:CC$=RIGHT$(CC$,LEN(CC$)-1):
   CC=VAL(CC$):RETURN
```

Line 24 begins with an error in logic. You have not seen all the program text to be able to make this call. Right now, the only way to get to Line 24 is from Line 22 when

I$<>CHR$(13). We can trace the path back to Line 60 and then to Line 2140 which tested to see that there was either a carriage return or a digit before sending the program to 60. So, to get to Line 24 in the first place, *VI* must be greater than zero and the *IF . . . THEN* test is redundant. For now the line stands as an example of a harmless error that costs a few bytes and a bit of time. But, when every byte counts, you need to watch out for these types of things.

First, *VI* is printed with a semicolon to hold the print position at the end of the character. Next the rest of the digits are entered through *LINEINPUTI$*, *VI* is converted to a string and *I$* is added to it. Again the right portion is stripped off to eliminate the leading space, the string is converted to a value and *RETURN*. Since the digits input through *LINEINPUT* appear on the screen, there is no need to print the *CC$* string at this time.

```
30 PRINT@229,"";:LINEINPUTI$:IFI$<>""THENCD$=I$
31 PRINT@229,USING"%   %";CD$
32 PRINT@236,"";:IFFG<>1THENLINEINPUTI$:
   I=VAL(I$):IFI<>0THENCA=IELSEELSECA=0
34 PRINT@236,USINGSS$;CA;:RETURN
```

Lines 30 to 34 get the date and amount. In Line 30, a print position, 229, is established and *LINEINPUTI$* is used to get an input.

If the date is the same as the previous entry, the user can press ENTER to return an empty string and *CD$* is not changed. Otherwise, *CD$=I$* and Line 31 prints the result either way. Line 32 is similar except the flag *FG* is tested. If a check is voided, *FG=1* and the amount is immediately set to zero and the input code bypassed. Here too, it is possible to enter a null string with ENTER only to repeat the previous amount. The amount is printed using the format string *SS$* to put the amount into the form ##,###.## and the *RETURN* is issued.

```
36 IFCC>0ORCC$="ADJ"THENCB=CB-CA ELSECB=CB+CA
37 PRINT@247,USINGSS$;CB;:PRINTUSINGSN$;CS$;:
   LINEINPUTI$:IFI$<>""THENCN$=I$ELSECN$=" "
```

Lines 36 and 37 are designed to be done in sequence in normal data entry. Our program convention says that checks and adjustments are to be subtracted from the previous balance while deposits are added. An interest credit would be entered as a negative credit. (I don't have enough money to have an interest bearing checking account so I have never tested the approach.) Line 37 prints the balance formatted using ##,###.##, prints the status, *CS$*, and inputs any note. If there is no note, the note variable, *CN$*, is assigned a space. The new file routine does not use Line 36 since I plan on entering only outstanding items. Cleared items, interspersed with outstanding ones, would not be entered and there will be no way to keep an accurate running balance. We will need to provide a way to correct the checkbook balance from the edit mode.

```
38 A$(CR)=CC$+"$"+CD$+"$"+LEFT$(CS$,1)+"$"+CN$:
   A(CR,0)=CA:A(CR,1)=CB:RETURN
```

```
40 CR=CR+1:LR=CR:GOSUB10:PRINT@224,STRING$(95,32):
   FG=0:RETURN
```

Line 38 makes a string of *CC$*, *CD$*, the left character of *CS$* and *CN$* each separated by a '$'. The string is assigned as a member of string array *A$(CR)* where *CR* is the current record number. The amount, *CA*, is assigned to numeric member *A(CR,0)* and the balance is put into *A(CR,1)*. Then control is returned to 60 which calls Line 40. I did not let the program fall through directly since Edit will probably have to handle the functions in Line 40 differently.

```
10 LC$=CC$:LD$=CD$:LA=CA:LB=CB:LS$=CS$:LN$=CN$

11 PRINT@96,USINGS4$;LC$;:PRINT" "LD$:
   PRINT@108,USINGSS$;LA:PRINT@120,USINGSS$;LB;:
   PRINTSTRING$(63,32);:PRINT@128,USINGSN$;LS$;:
   PRINTLN$:RETURN
```

In the New File mode, we will always be adding records at the end of the file. When *CR* is incremented, it is appropriate to set the *LR*, last record variable, to *CR*. Subroutine 10 moves the current-record data to the previous-record variables and prints this record towards the top of the screen. *PRINT@224,STRING $(95,32)* erases the current record area of the screen. The flag *FG* is set to zero and control returned in turn to 60 and 2140.

```
2150 I=INSTR(1,"DAVES"+CHR$(94)+CHR$(10),I$):
     IFFG=0THENONI GOSUB62,64,66,200,900,68,18ELSE
     ONI GOSUB2160,2160,2160,200,900,68,18
2155 IFCR=LR THEN2130ELSE2140
2160 RETURN
```

If user needed some other routine than check entry, the appropriate key stroke brings the program to Line 2150. *INSTR* starts searching the string *"DAVES"+CHR$(94) +CHR$(10)* for the character in I$. These characters represent deposit, adjustment, void, edit, save, up arrow *(CHR$(94))* and down arrow *(CHR$(10))*. If a match is found the character count from the beginning of the string is stored in I. We then encounter the flag *FG* again, this time set to 1 if we are scrolling through the file and otherwise zero. If *FG=0* the first *ON I GOSUB* is chosen and BASIC counts up one line number and transfers control to that line. The first three, 62, 64 and 66 send the program to the deposit, adjustment and void routines.

```
26 CC$="DEP":PRINT@224,CC$;:RETURN
28 CC$="ADJ":PRINT@224,CC$;:RETURN
62 GOSUB26:GOSUB30:GOSUB37:GOSUB40:RETURN
64 GOSUB28:GOSUB30:GOSUB37:GOSUB40:RETURN
66 I$=CHR$(13):GOSUB22:FG=1:GOSUB30:GOSUB37:
   FG=0:GOSUB40:RETURN
```

Lines 62 and 64 are nearly identical to Line 60 except that a routine to enter a check number is not used. Rather one of the subroutines to assign *DEP* or *ADJ* to *CC$* and print

CC$ is called. Line 66 is the "void check" which goes to Line 22 to get check number, Line 30 for the date and amount, Line 37 to print a balance and get any note, and then to 40 to move the current entry up the screen preparatory to the next entry. We mentioned the *FG* flag being set to 1 when we discussed Line 32. Here is where that happens and note that it is carefully reset to zero before departing the routine. This may not be necessary since *FG=0* appears in 40 as well. But, there may be a time when we use 37 without using 40, so this is surprise insurance.

Returning to Line 2150, if *FG=1* the second *ON I GOSUB* sequence is chosen and the first three positions hold 2160. This prevents the program from reaching the deposit, adjustment and void routines while scrolling.

Line 2160 has only a *RETURN*, but when control returns to 2150 it immediately is sent to the next Line 2155. If we are scrolling, *CR* will be less that *LR*. The position variable, *PO* used to set the print position in 2140 is set to position the *INKEY$* cursor on a white space on the message line. When *CR=LR* the program is in the data entry mode and the program is sent to line 2130 to print the ENTER OUTSTANDING ITEMS message and reset *PO* to 244.

This is a good place to discuss how a *GOSUB* works. On a *GOSUB* call, the address in the program from which the call comes must be stored on the stack. If the program leaves the subroutine other than by a *RETURN* the return data stays on the stack. If this is done frequently, the stack builds until memory is used up and an OM Error is sent. In the second *ON I GOSUB* in Line 2150, there is the option to send the program directly to 2155, but then the stack is not cleared. There is one case where we will have to take our lumps with regard to the stack. I plan the escape from the new file routine to be through the save and then to the standard data entry routine and one set of addresses will be left on the stack. This is acceptable since it will only be used once during a session and not at all during most sessions.

This seems to be enough for this month. I am beginning to think this project will reach book length. Perhaps I should not be surprised. In the August 1984 RAINBOW (Page 232) mention was made of a book that deals with only one program. This book, *TAIPAN: A Game in Context* by Art Canfil, Karl Albrecht and Jim McClenahan will be published by Hayden Book Company. They have well proven that a book can be written about one program and that it can be a very readable and enjoyable book at that. I know this because Hayden asked me to do a review of the manuscript and program for them. I went through it quite thoroughly and enjoyed doing so.

The authors do the same type of thing that I have been doing here, going line by line through the BASIC program. They discuss the logic behind the code and the history behind the logic. Here the game context is the China Trade about 1860. I also turned my 11-year-old program tester loose on the game and he pronounced it good after quite a few hours of play. So when you see the book, be sure to buy a copy. I know I will since I had to send the manuscript back.

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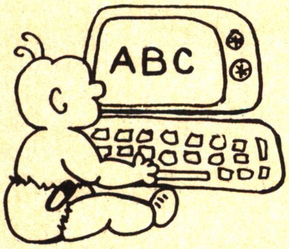

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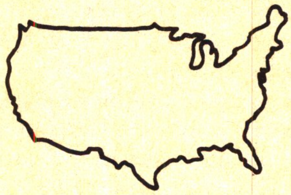

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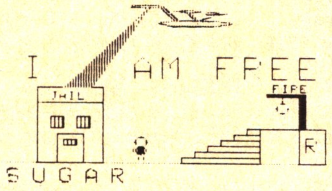

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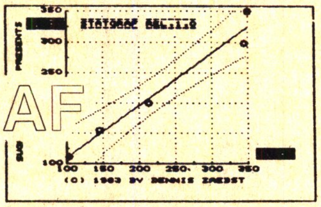

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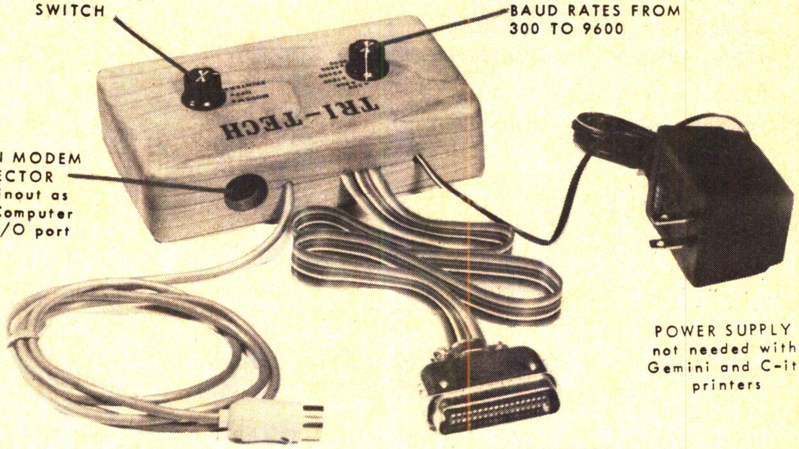

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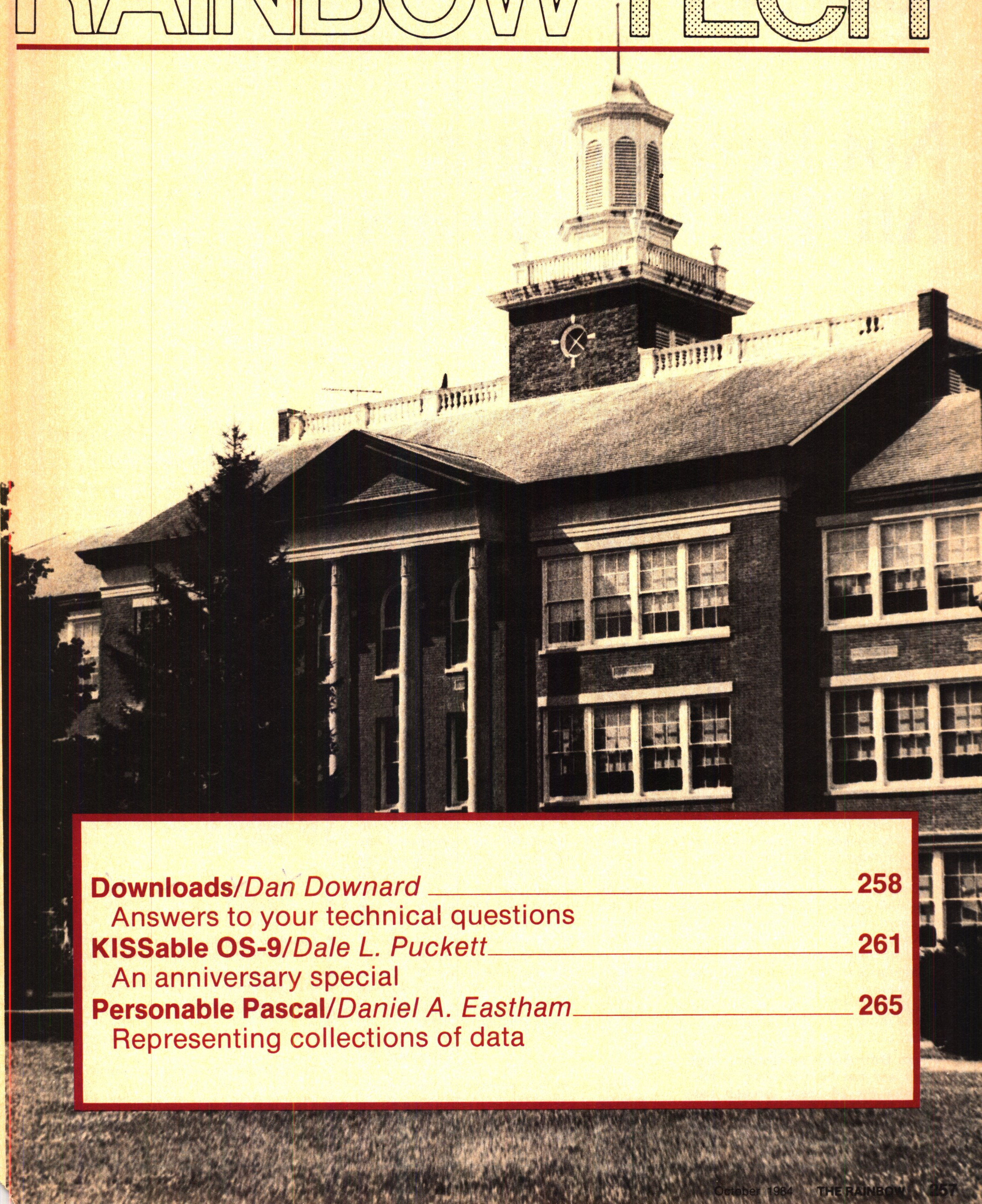

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RAINBOWTECH
DOWNLOADS

Not Recognizing All The Characters

By Dan Downard
Rainbow Technical Editor

• *In the June '84 "Downloads," Richard Steinbrueck had a problem with a program that wouldn't work after it had been saved in ASCII format and reloaded.*

Apparently, his program had a machine-language routine attached to the end of the BASIC text. The technique for doing this was described by Charles J. Roslund in the January '83 RAINBOW (along with a technique for imbedding ML in a REMark statement). This technique involves increasing the end-of-BASIC pointer at decimal 27 and 28 by the length of the ML, and storing it in the memory opened up. When you save the program normally, everything between the start-of-BASIC and the end-of-BASIC pointers is saved. However, when you ASCII save, only the BASIC text is saved. The end-of-BASIC text is marked by three Hex zeroes, which prevent trying to list ML as if it were BASIC. Thus, when Mr. Steinbrueck ASCII saved his program, the ML was lost, and when he reloaded and ran, his CoCo tried to execute a nonexistent routine.

The only solution I can see is to save the ML separately and replace it after reloading. Mr. Steinbrueck can do this by using PEEK *to find the three Hex zeroes, which will give him the starting address to save. The end-of-BASIC pointer will give him the ending address. A* SAVEM *on this block of memory will save the ML. Then he can use Roslund's technique after reloading the ASCII program.*

This isn't a good solution, since it's rather clumsy, but it should do the job.

Robert L. Hawkins
Columbus, OH

Thanks for the information, Robert. Similar letters were received from Darren Croft and Fred Scoville.

(Dan Downard is an electrical engineer and has been involved in electronics for 24 years through ham radio [K4KWT]. His interest in computers began about five years ago and he has built several 68XX systems.)

TIDYING UP

• [*In the March "Letters To The Editor"*] *Jack Thompson wrote about a disk problem and you suggested a head alignment kit. I have a similar problem on my disk system. I have no trouble with programs that are written on my drive, but every program I buy will not load. They start to load, then hang up with the motor running and the keyboard dead. If I can manage to get one loaded, and it's not copy protected, I can save it and then load it with no more trouble. But most will just not load. Where can such a kit be found? I have not seen one in the ads, and Radio Shack doesn't carry one. Better still, has an article been published which gives the procedure? I have test equipment and technical experience, but I need information.*

Mickey Kaylor
Cleveland, TN

Mickey, we have received several requests similar to yours. The head alignment kit we referred to is actually a head alignment disk. Several companies manufacture them. Radio Shack specifications are based on a "CAT'S-EYE" diskette.

These disks have a 125 KHZ signal precisely recorded on tracks 00 and 34. By using an oscilliscope connected to the electronics in your disk, drive you can measure the phase of the read head and "align" your heads. We do not recommend this for amateurs. If you're still game, obtain a copy of Radio Shack Service Manual No. 26-3022/3023. This is the floppy disk drive service manual and gives complete alignment procedures.

The only normal maintenance that should be necessary for your drive is cleaning your heads. Remove all of the accumulated oxide and dirt with a lint-free cloth using isopropyl alcohol. Be careful not to touch the head. Another method of cleaning your heads is by using head cleaning disk available from Radio Shack.

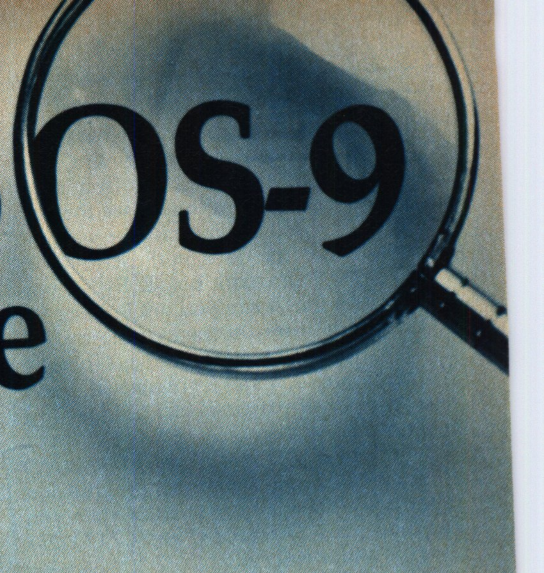
ROM PACK ROUNDUP

• *I have a 64K CoCo 2 disk system and would like to use all of it. Could you tell me how to transfer a ROM Pak to disk? Also, could you tell me how to use the full 64K or get into the 64K mode?*

Mike Gibson
Fenton, MO

Mike, if you run the program listed in "Downloads," March 1984, named *ROM-RAM* you will be in the 64K mode. Now for your ROM Paks, use the following procedure:

There's more to OS-9 than meets the eye.



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1) Unplug your disk controller (with the power off!). After putting a piece of tape on pin 8 of your ROM Pak turn on your CoCo. This will prevent the ROM Pak from automatically booting. You should see the normal BASIC sign-on message. By the way, pin 8 is usually the first trace on the left bottom of the ROM Pak circuit board. By left bottom I mean that when you are holding the ROM Pak, position the traces at the top. Pin 8 is usually the first trace from left to right. Normally pins 2, 4 and 6 are unused. Use a narrow piece of plastic electrical tape. Just cover pin 8.

2) *CSAVEM"NAME",&HC000,&HDFFF,&HC000.* This puts the program on tape. If you have a tape-based system you can simply run *ROMRAM* and *CLOADM* the tape and it will run.

3) For disk systems things are a little more complicated. Next plug your disk controller back in (with the power off!). *CLOADM "NAME",&H8000.* This offset loads the program at $4000 to $5FFF. Do not execute the program.

4) *LOAD* and *RUN* the following BASIC program:

```
10 FOR X=&H6000 to &H6013
20 READ A:POKE X,A
30 NEXT X
40 DATA 142,64,0,16,142,192,0,166
50 DATA 128,167,160,16,140,224,0,38
60 DATA 246,126,192,0
```

5) After the OK prompt appears, type the following: *SAVEM"NAME",&H4000,&H6013,&H6000.* The program will be on your disk. To run it use *LOADM"NAME"* and *EXEC.*

This method will work for about 90 percent of your ROM Paks. Some are protected by writing and reading RAM values to insure that they are in ROM, but we will leave this up to you.

SOME ASSISTANCE

• *I have to respond to two letters in the July 1984 issue of* RAINBOW. *The first letter was from A. L. Johnson of Georgetown, Colo. Instead of typing* LOAD"FILENAME",R *why not just type* RUN"FILENAME"? *This will clear the computer (same as* NEW*), then load and run the program. There's much less typing.*

The second letter was from Dr. Ted Jaeger of Fayetteville, N.C. I had the same trouble with my CoCo and a DMP-120 printer. The problem has two possible causes.

1) The early DMP-120 printers had a design error. If his printer is within the serial number range of the defective printers, Radio Shack will install a modification for him.

3) If his printer is above the defective serial number range or if the modification has already been installed, then he will need to upgrade his BASIC ROM to level 1.2. There is a very close timing problem between the printer and the CoCo. I know of two CoCo's that have had this problem with DMP-120 printers and both were corrected by installing BASIC 1.2.

I don't know what the POKE 151,255 *is for but I don't use it and I run my DMP-120 at 1200 Baud.*

Back to letter number one for a moment. If Mr. Johnson wants to call another program, all he has to do is RUN"MENU," *it will clear, load, and run.*

Glenn M. Dickson
Houston, TX

Glenn, maybe it's a bug in BASIC but *RUN"FILENAME"* does not always work. I have several disk-based programs that use the syntax *RUN"FILENAME.EXT:0"* and this method seems to work fine along with *LOAD "FILENAME",R.*

Thanks for your comment on the DMP-120. BASIC 1.2 corrected a flaw in the previous ROMs. In BASIC 1.0 and 1.1 the handshake signal from the printer was not polled until after the character was sent. Therefore, several printers other than the DMP-120 had problems with character dropouts, etc.

POKE 151,255 inserts a delay after sending a carriage return. The delay is proportional to the constant at memory location 151. This value is initialized to zero unless you change it. This delay was designed for mechanical printers requiring time for the carriage to return.

MAYBE U2 OR U4

• *I have a D-board 32K (piggyback) Color Computer with single disk drive. I still have the old BASIC 1.0 version. I have two problems:*

1) My computer quit generating sound. I can't save any programs to cassette (works fine with the disk drive, though). Any "sound" commands or "play" commands do not generate anything. My question is: I'm kind of a do-it-yourself-type of guy and I was wondering if you can tell me which part of the computer is kaput. I can just go ahead and buy the part and put it in myself.

2) My other problem is with Radio Shack's BWDUMP. *I have a feeling I need an eight-bit driver (if it's not built-in) because half the time this program will not work on my computer. And if it does work, the picture is off-center.*

Is there any kind of patch that will fix this? Is there an eight-bit driver in the program?

Noel P. Tomas
Virginia Beach, VA

I like your terminology, Noel. "Kaput" would not be a very appropriate name for a computer, but it's very catchy. That would be a good name for a magazine column like this one.

If you will obtain a copy of the TRS-80 *Color Computer Technical Reference Manual* (Cat. No. 26-3193) Page 66 has a schematic of the cassette circuits that are kaput. I would check your RS-232 port. If it is working, or if your printer is working, try replacing U2, a MC14050B. If your RS-232 port is not working, replace U4, a 68231 PIA chip.

Any graphic information sent to a printer requires an eight-bit printer driver. At one time, Radio Shack offered a patch for your problem. I believe your local rep can order it for you. Ask him for the "eight-bit driver routine" for the 1.0 BASIC ROM. Your best bet is upgrading to the 1.1. or 1.2 BASIC ROM.

'AS' IS THE KEYWORD

• *I've owned a TRS-80 64K Color Computer for about a year. And recently I typed a program which contained several variables in it. One particular variable was* AS.

When the program was RUN *and reached the line that had the variable* AS *in it, a SN Error appeared on my monitor. When I ran the program on my teacher's 64K Color Computer, it still showed a SN Error. But it didn't show on any other Color Computer, except the 64K.*

My question is why doesn't the AS *variable work on the 64K Color Computer?*

Kong Sauw
Oakland, CA

We had the same problem, Kong, back in the pre-disk CoCo days. After the disk systems arrived, we realized that although it's not very clear in the manuals, *AS* is a Disk BASIC keyword. It is used in conjunction with the *FIELD* command to format the variables in a random access file.

JOYSTICK USERS' TIP

• *I own a pair of Radio Shack deluxe joysticks. When I bought them, I was told that on some of them, the pin holding the joystick in position would slip. I ended up having this problem with both joysticks.*

I would like to know if it would be wise to glue the pin in instead of having to take the joystick apart after every five minutes of play to push the pin back in. Any help would be appreciated.

Fred Turner
Laredo, TX

Thanks for the tip, Fred, I see no reason why the pins should not be glued in place. You must really give them a workout!

• *I found out that I had a 64K machine instead of a 32K Radio Shack upgrade.*

Why would Radio Shack put 64K chips in somebody's CoCo who asked for only a 32K upgrade? I have the 1.0 ROM — I thought that wouldn't work with 64K? You have a good magazine; keep on trucking.

Bob Hart, Jr.
Alton, IL

There never were any 32K chips on the market, just half-bad 64K chips. They were considerably cheaper than good chips. Radio Shack designed the CoCo so that these chips could be used if necessary. I've only run across one set of half-bad (32K) chips and they were in a "D" board CoCo. You need the 1.1 Color BASIC ROM to enable your 64K, Bob. Try typing *EXEC41175* and see what happens.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity.

RAINBOWTECH

KISSable OS-9

First Anniversary Special: An Interview With Ken Kaplan

Dale Puckett
Rainbow Contributing Editor

This month, our first anniversary column is a bit different. We have what we hope will be a special treat for you. While in Chicago for RAINBOWfest we attended Ken Kaplan's seminar about the secrets of OS-9. Ken is the president of Microware Systems Corporation of Des Moines, Iowa, creators of OS-9. We tried to take good notes and you'll find some of Ken's most revealing comments and solid advice later in this column.

We also secured a personal interview with Ken. We had quite a few questions and we thought you would like to see the answers.

What's the real story behind OS-9? Does it have a place in the future of the Color Computer community? What's on the immediate horizon?

Here is the transcript of our interview.

Rainbow: Ed Juge told the crowd at the CoCo Community Breakfast this morning that if they wanted to maintain software compatibility on the Color Computer in the future, they should switch to the OS-9 operating system. Why did he say that?

Kaplan: I can't speak for Radio Shack. However, there's only so far they can go with the Color Computer hardware and still maintain 100 percent compatibility with Color BASIC software. OS-9 is different, because with OS-9 you don't have to go around the system software to get the job done.

For example, there are a bunch of routines in Color BASIC that have been documented to do specific things — like get a character from the keyboard. But, there are also a bunch of undocumented routines. People who have written a lot of software for the Color Computer have used both the documented and undocumented routines. Some people have even gone out and worked directly with the hardware. That means that most of the applications software that runs on today's Color Computer BASIC systems is pretty much locked into the present design. The programmers had to work directly with the hardware to get around the limitations in Color BASIC.

OS-9, because it has so many more functions, doesn't force software authors to commit these sins. I think if developers use BASIC09 and OS-9 when they develop software in the future — and I think Radio Shack is saying the same thing — that Tandy will be able to come out with new, advanced machines that will run software developed on the older models. They will use OS-9 as a bridge to get from machine to machine.

Another thing that is happening in the market now is the realization that 64K bytes of memory is not enough. Memory is getting cheap now and 64K is just not enough — especially when you are doing a lot of graphics work.

> ***"Another thing that is happening in the market now is the realization that 64K bytes of memory is not enough."***

(Dale L. Puckett is a free-lance writer and programmer who has worked with the Motorola family of microprocessors since 1976. He just completed his first book, The Official BASIC09 Tour Guide, *this summer. It has been published by Microware and made its debut at the Chicago* RAINBOWfest. *He is the author of* DynaSpell, Readtest, Esther *and* Help, *which are available from Frank Hogg Laboratories. He serves on the Info World Software Review Board and is a Chief Warrant Officer in the U.S. Coast Guard.)*

OS-9, unlike other software, Color BASIC and FLEX for example, can easily move beyond the 64K limitation. OS-9 can use 256K — even a megabyte — and a 19 or 20 megabyte hard disk. In fact, it thrives on it.

Rainbow: Radio Shack has announced a new licensing arrangement that will let software authors put OS-9 on a disk with a piece of application software. How does this affect the application software people who may now get inspired to do something for Color Computer owners, and how does it effect the user?

Kaplan: I don't know the exact details. I know we have allowed Radio Shack to do this with our license. [Essentially], they are doing it for the end user. It should simplify things a lot. In the past, your customers had to go out and buy OS-9. Then, they had to set it up. When they bought your application, they had to copy all of your files to an OS-9 disk. Then, they found they had a problem with disk space and had to remove a few programs to make yours fit.

> ***"Another thing that looks good for the future is that — without being too specific — there is a lot of action on OS-9 68000. There are a lot of companies moving toward OS-9 — including some well-known names."***

With this new license, application software houses can sell a completely turnkey program that consumers can plug in their disk drive and run right out of the box. They won't even see OS-9. This will really simplify things for the user because the software house can pre-install everything.

Rainbow: Do you think Radio Shack's new program will stir an interest in OS-9 and build a larger user base that application programmers can depend on if they decide to write software with OS-9 rather than Radio Shack Extended Color BASIC?

Kaplan: No question about it. It's a pretty safe thing to do. In fact, the safest thing for any developer in the long run would be to do all development with OS-9. OS-9 on the Color Computer is growing by leaps and bounds.

Another thing that looks good for the future is that — without being too specific — there is a lot of action on OS-9 68000. There are a lot of companies moving toward OS-9 —including some well-known names. There's going to be a lot of 68000 activity and a lot of systems. And, there'll be a lot of applications software. Of course the high level languages like BASIC09 and C will run on both the 6809 or the 68000. That will broaden things even more. So, if you write an application for the Color Computer now, you can move it to the 68000 very easily.

Rainbow: In other words, it would run on any of these new machines — those "big names" that will help expand the OS-9 user base. Will these new machines be affordable?

Kaplan: The prices will vary. Some will be very affordable —home systems. From there they will run all the way up to the high ticket professional systems.

Rainbow: Almost everyone is talking about the Sinclair. Is OS-9 68000 headed for that computer?

Kaplan: I can't say specifically at this time. I just can't announce who our customers are.

Rainbow: What about the Macintosh?

Kaplan: We've got a Macintosh and we've played with it. It's a very nice system. I think Apple's philosophy is to keep the Macintosh locked very tightly in their control. They want to control all the system software and all the hardware. That's why they designed it so that it's not really expandable. You can't plug in extra cards like you can on the Apple IIe or the IBM. I think they are encouraging people to write applications programs for it but they're not encouraging companies like Microware.

Rainbow: I understand they want all application programs to work through their windows. What would be the advantage of having an OS-9 type operating system in that environment?

Kaplan: I don't know. The present Macintosh software is not multitasking. It does not have the UNIX type features. It has sort of a tree structure file system but I find it sort of confusing, the way the file system works. It could be cleaned up a little.

Rainbow: One of the things that has been a mainstay on the Color Computer has been the graphics capability of Microsoft BASIC working with the SAM and VDG chips. Are there any plans for the future that would expand that graphic capability to OS-9 or BASIC09?

Kaplan: Yes, there's some discussion about that right now. I think you'll see future releases of OS-9 that will be more capable. Some of the things that are being kicked around right now include a paint command, a draw command, and a built-in Hi-Res graphics package.

Rainbow: Would that run at the assembly level?

Kaplan: Yes, but it would be accessible from BASIC09.

Rainbow: Your GFX package is I-code, right?

Kaplan: Yes, but you see GFX actually just drives the operating system. A module within OS-9 contains the graphics routines. They are activated by control characters. This means that you can even display graphics from the Shell. GFX just gives you a cleaner interface. You don't need to know all those control characters. GFX is a little translation module.

Rainbow: What do you think is the OS-9 user base on the Color Computer?

Kaplan: I'd say approximately 50,000, maybe more.

Rainbow: What's the problem with OS-9? Look at the magazines. RAINBOW is the only one that covers OS-9. They say there are not enough users because out of the million CoCos sold, there are only 100,000 disk drives. That limits the usability. What's the answer in the long run? Will OS-9 ever get to the consumer level — I mean like Commodore?

Kaplan: I think it's an illusion. First of all, I believe that far more than 10 percent of the Color Computer owners use disk drives. I would guess it's more like 40 or 50 percent. I don't buy that 10 percent figure.

Rainbow: Thank you, Ken!

Kaplan: Thank you for all your support in THE RAINBOW.

Ken Kaplan Addresses RAINBOWfest Crowd

Just before the interview above, Ken Kaplan presented a few "OS-9 Secrets" to several hundred RAINBOWfest attendees. He opened with his perception of the mistake some people made when they bought OS-9.

Kaplan: People go to their local Radio Shack store in the mall, buy OS-9 and take it home. They take it out of the box, plug it in and then say, "What's it going to do?"

Well, OS-9 is wonderful if you want to try to write an assembly language program. But, not that many people have that in mind. And, it is a little complicated.

I think most people like to do, want to do, the kinds of things you can do in Color BASIC. Except they want more features, more capability. So really, you need to think about OS-9 not as an end — a primary tool — but rather, you must think of it as a foundation.

OS-9 is the basis for running other programs. It gives you a very powerful foundation. All features in OS-9 allow people writing applications, or yourself when you write a program, to use advanced programming concepts and techniques to get the job done more effectively. And in fact, in some cases do things you couldn't do otherwise.

BASIC09 Is A Special Tool

BASIC09 is also of special interest to you. It's another layer that goes on top of OS-9 and will probably be the main day-in day-out tool you will be using.

BASIC09 is a very, very powerful BASIC. And, we've added some things to standard BASIC09 to make it even more useful on the Color Computer. Graphic commands, joystick inputs and things like that are a perfect example.

The neat thing about BASIC09 — besides the language itself —is the fact that you can get to any operating system command from inside BASIC. When you're in the command mode, you can type a $ and run any OS-9 command, just as you would if you had booted the system up and never gone into BASIC.

Also, you can run any of the operating system commands from statements in your program — and that's a very powerful capability. In fact, a lot of people who have used OS-9 have the start-up file automatically load and execute BASIC09. They do all of their work right inside BASIC09 and never need to talk to OS-9. That's a very good way to do things.

About Those Crowded Disks

One thing that we've heard a lot of comments about from people who have had some difficulty getting BASIC09 going, has to do with the fact that there's so much software crammed on that system disk you receive from Radio Shack. In fact, there's so much software on it, that BASIC09 won't fit. As a result, a lot of people have tried to put their BASIC09 disk in drive one and leave the OS-9 disk in drive zero. When they do this they run into several problems.

> ***"The main thing about OS-9 for the average person — and the reason it's a real step forward — is that it is closely modeled after UNIX."***

I recommend that you make two backup copies of your system disk, and then put the one you bought away for when you crash the disk, or your cat eats it, or your child spills a bottle of milk on it, etc. Next, label one of those backup disks as your BASIC disk and label the other one as your assembly language disk. If you get around to doing some assembly language programming, your assembly language disk will be there ready to go. It's got everything you need on it when you take it out of the box.

If you're going to work mainly with BASIC, you need to start by deleting some of the files that are on your disk. I would delete the commands that are designed mostly for machine language programming. That will free up a lot of space. In fact if you want, you can delete the editor and assembler program. After you do this, BASIC09 and the two other files —the GFX module and the *INKEY* module — will fit nicely. You'll be ready to go.

As you move further along, you'll

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notice a few other sort of arcane utilities on your system disk that you won't use or very rarely use. You can get rid of these, too. As long as you've made a backup disk, you can feel free to clean things up.

Once you realize that OS-9 is a foundation for building software, you realize that the programming languages available on OS-9 are pretty important. Aside from BASIC09 and C, which are the two main languages available for the Color Computer right now, there are several additional Microware languages coming soon.

Later this year you will probably see a PASCAL compiler. A FORTRAN compiler should follow sometime toward the end of the year. Later, a COBOL compiler will be available. These are all very good languages and should cover almost any kind of program that you need to write.

OS-9 Is Important Because It's So Much Like UNIX

The main thing about OS-9 for the average person — and the reason it's a real step forward — is that it is closely modeled after UNIX. I think the world is beginning to realize that UNIX and UNIX-style operating systems are the future.

The Color Computer is a very extraordinary machine. It is the only machine in the world I know of that will give you the entire UNIX environment for under $1,000 — including a full-blown C compiler. This can give you a tremendous advantage, particularly if you're a student. It gives you a little taste of what tomorrow is going to be like.

A Myth

A number of myths have been promulgated by the press and others about OS-9 because it's so new. One has to do with the issue of Level I vs. Level II. Level I came out about a year and a half before Level II, right? I used Level I for a long time and the fact that there's a memory restriction in Level I that keeps it from being useful is absolute fallacy.

Most people who got started on OS-9, used Level I for a long time. There's plenty of memory on the Color Computer to do all sorts of things with Level I. In fact, there are methods in BASIC09 that you can use to make better use of available memory because things are modularized. You can chain programs together and so on. That's much easier and convenient to do in BASIC09 than in any other software you can run on the Color Computer.

I like to use the analogy of buying a car. You don't go out and buy a Greyhound bus so you can take all your friends when you go somewhere. Rather, you buy a car that suits your needs and has the right capacity for you right now.

There's no reason why Color Computer OS-9 can't do that. I use it a lot at home, all the time, and I very seldom find myself getting frustrated by memory restrictions.

Another Myth

Another common myth about OS-9 has to do with its multitasking abilities. It's sort of extraordinary that a low cost machine like the Color Computer can do multitasking.

Then, people say, "Well, why would I want to plug three or four terminals into a small computer?" or "How could I? Is it really practical?"

The answer is, for most people, no. You can, practically speaking, run a couple of users on a Color Computer. This is timesharing.

Multitasking is not the same thing. There are a number of applications where multitasking on a single user system could come in very handy. Here's an example.

Suppose you want to set up a home security system with your Color Computer. You have sensors around the house and you know how to write the program in BASIC. You turn on everything and run your program. It works.

Then, several hours later you decide you want to use your computer to play some games or need to use your word processor to write a letter. At this point you discover that if you do this you have to turn off your home security program. Your computer can only do one thing at a time.

OS-9 frees you of this restriction. It lets you run your home security program as a background task under OS-9 while you use your Color Computer to do other things at the same time. This type of application is very valuable, even on a small system like the Color Computer.

Next Month, Data Communications

They were a long time coming, but now there are several intelligent terminal programs running under OS-9. Since the November issue of THE RAINBOW features data communications we'll describe these new offerings in great detail.

16K

Constructing Complex Data

By Daniel Adams Eastham
Rainbow Contributing Editor

This month we are going to be talking about representing collections of data. That is, ways that PASCAL allows you to construct complex data items that consist of two or more simpler data items. This is a very important capability and makes PASCAL well suited for writing programs for business or systems-oriented applications.

ARRAYs

An array is a complex data structure that we used last month and that you have also used in BASIC. One way to think of an ARRAY is that it is a collection of *like* data types. For example:

```
VAR DaysInMonth : ARRAY
   [January..December] OF 28..31;
```

This is a collection of 12 data items which are all integers in the range 28 to 31.

(Daniel Adams Eastham holds a B.S. degree in computer science and has 13 years experience in systems and communications programming, including work on the original Telenet packet switching network. He is the author of the DEFT PASCAL Workbench *and is currently president of DEFT Systems, Inc.)*

Collecting Unlike Data

But suppose we want to group (or collect) a number of data items together that are *not* all of the same type. A simple example might be an address book. The kinds of information you would want to keep are:

Name
Address
Phone Number

These three items are not at all the same. In fact, the last two are also collections of data items.

Name

Address
  Street
  City
  State
  ZIP Code

Phone
  Area Code, Exchange, Number

RECORDs

In PASCAL, a RECORD is used to collect unlike types. For example, we can represent the address book information shown above using the following record declaration:

```
TYPE AddrBookInfo = RECORD
    Name : String;

    Address : RECORD
       Street : String;
       City : String;
       State : String;
       ZIP Code : Real;
       END;

    Phone : ARRAY [1..3] OF Integer;
  END;
```

When you create a record, you start with the word RECORD, list the *fields* and their types that go into that record and finish up with the word END. Each field in the record can be independently typed so that you can collect many different types of data together. Like an ARRAY, a RECORD has an *order.* That is, the first field listed in the record occupies the first area in memory, the second field occupies the next higher memory locations and so on.

You can see in the above example that in the record AddrBookInfo, we have listed the three fields *Name, Address* and *Phone. Name* is a field which is simply a string. *Address* is a record, also having several fields. *Phone* is declared as an array of three numbers.

As you can see, records provide you with a very flexible means of describing information. This capability to create any number of levels of fields of any type is one of the more powerful features of PASCAL's typing facility.

Using RECORDs

Once you have created a record type variable, how do you use it? In PASCAL, you can PUT and GET record variables to FILEs (discussed in a later column), copy one variable to another of the same type via an assignment statement or pass it as an argument to a PROCEDURE or FUNCTION.

Like the elements of an array, you can also access the fields of a record. This is done by using the record variable name followed by a period (.) and then the field name. For example, assuming that we have declared a variable *AddrBook* of type *AddrBookInfo,* we can use the following notation:

```
AddrBook.Name := 'John Smith';
AddrBook.Address.ZipCode:=99999;
AddrBook.Phone[1] := 202;
```

In the first line, Name is a field within AddrBook. The resulting factor is a string type since Name is a string field.

In the second line, Address is another field within the record AddrBook. Address is also a record and in this case the field ZipCode is being referenced. This results in a factor which is of type real.

In the third line, Phone is also a field within the record AddrBook. In this case, Phone is an array and the reference is to the first element of that array. The resulting factor is an integer.

WITH Statement

Sometimes you want to access several fields in a given record and would like to not have to keep repeating the record's name every time. The PASCAL statement WITH provides a shorthand notation for doing just this very thing. For example, the above three statements could be rewritten as follows:

```
WITH AddrBook DO BEGIN
Name := 'John Smith';
WITH Address DO ZipCode :=
99999;
Phone[1] := 202;
END;
```

When the compiler sees any variables inside the WITH statement, it first checks to see if they are fields within the specified record. The ZipCode assignment shows how WITH statements can be nested. In this case, Address is a field within the record of the outermost WITH (WITH AddrBook) and is in turn a record used in a nested WITH statement.

Variants

Sometimes the information you want to collect has some variations. For example, an employee record might contain the following:

```
TYPE WorkerClass = (Manager,
  Worker, Secretary);

 Employee = RECORD
  Personal : AddrBookInfo;
  Salary   : Real;

  CASE Class : WorkerClass OF

  Manager : (TotalWorkers : Integer;
             Budget       : Real)

  Worker : (ProdRate : Real;
            ProdName : String);

  END;
```

In the above example, we have a field Personal which has been typed as AddrBookInfo. This means that this single field contains all the information in the AddrBookInfo record that we saw above. The field Salary has also been added to provide the employee's salary.

> *". . . records provide you with a very flexible means of describing information."*

Below this is a section of the record called a *variant.* In this section, exactly one of several sets of fields is used depending on the value of a *tag* field. In this case, the tag field is Class and is of type WorkerClass. When this field contains the value Manager, the fields TotalWorkers and Budget can be used. When this field contains the value Worker, the fields ProdRate and ProdName can be used. Variant field are accessed in exactly the same manner as the regular fixed fields.

For example, if the information in the record is for a manager, then the Class field will contain the value Manager, TotalWorkers will contain the number of workers reporting to that manager and Budget will contain the amount of budget allocated to that manager. The manager does not need information about product rate or the name of the product that he produces since he does not produce any product.

Most PASCAL's implement variant records by using the same memory locations for each variant. In this case, TotalWorkers and Budget are put in the same memory locations as ProdRate and Prodname.

Sets

Another collection of data items that PASCAL supports is the *set.* A set is a collection of the values of a type. For example:

```
TYPE Letters = 'A'..'Z';
VAR LetterSet : SET OF Letters;
```

LetterSet is a collection of the uppercase letters. This means that each of the uppercase letters may or may not be present in the set. Some of the values that LetterSet may have are:

```
LetterSet := ['A', 'C', 'J'..'Q'];
LetterSet := [ ];
```

The first assignment statement assigns

```
DEFT PASCAL V3.3                 (C) 1984 DEFT SYSTEMS, INC.
Character Counting Program

00 0000    (***************************************************************)
00 0000    (*                                                             *)
00 0000    (*  This program reads characters from the keyboard and       *)
00 0000    (*  determines how many characters of each category were      *)
00 0000    (*  found as well as the number of each character.            *)
00 0000    (*                                                             *)
00 0000    (*  Instructions:                                              *)
00 0000    (*     Just type in as many lines of characters as you         *)
00 0000    (*     want.  When you are done, hit the CLEAR key.  The      *)
00 0000    (*     program will then display its accumulated counts.       *)
00 0000    (*                                                             *)
00 0000    (***************************************************************)
```

```
00 0000
00 0000   PROGRAM CountChars (Input, Output);
00 0000
00 0000   CONST FirstChar = ' ';
00 0000         LastChar  = 'z';
00 0000
00 0000   TYPE  CharClass = RECORD
00 0000                       Range : SET OF Char;
00 0000                       Count : Integer;
00 0000                     END;
00 0000
00 0000   VAR   UpperCase : CharClass;
00 0000         LowerCase : CharClass;
00 0000         Numeric   : CharClass;
00 0000         Special   : CharClass;
00 0000         Counts    : ARRAY [FirstChar..LastChar] OF Integer;
00 0000         ThisChar  : Char;
00 0000         ThisLine  : String;
00 0000         I         : Integer;
00 0000
00 0000   BEGIN
01 0008     WITH UpperCase DO BEGIN
02 0008       Range := ['A'..'Z'];
02 0020       Count := 0;
02 0024       END;
01 0024
01 0024     WITH LowerCase DO BEGIN
02 0024       Range := ['a'..'z'];
02 003C       Count := 0;
02 0041       END;
01 0041
01 0041     WITH Numeric DO BEGIN
02 0041       Range := ['0'..'9'];
02 0059       Count := 0;
02 005E       END;
01 005E
01 005E     WITH Special DO BEGIN
02 005E       Range := [FirstChar..LastChar] -
02 0074            (UpperCase.Range + LowerCase.Range + Numeric.Range);
02 0098       Count := 0;
02 009D       END;
01 009D
01 009D     FOR ThisChar := FirstChar TO LastChar DO
01 00B5       Counts[ThisChar] := 0;
01 00E0
01 00E0     Page;
01 00EC     WRITELN;
01 00F4     WRITELN ('COUNT CHARACTERS');
01 0116     WRITELN;
01 011E     WRITELN ('ENTER DATA TO BE COUNTED');
01 0148     WRITELN ('WHEN DONE, HIT THE CLEAR KEY');
01 0176     WRITELN;
01 017E
01 017E     WHILE NOT EOF DO BEGIN
02 019B       READLN (ThisLine);
02 01B1
02 01B1       FOR I := 1 TO ORD (ThisLine[0]) DO BEGIN
```

the set containing the letters 'A', 'C', 'J', 'K', 'L', 'M', 'N', 'O', 'P' and 'Q' to the variable LetterSet. The set value is denoted with square brackets containing a list of values of the base type of the set. In the second assignment statement, LetterSet is being assigned the value of the empty set.

Operations on Sets

PASCAL supports several operations for sets. In addition to copying one to another in an assignment statement, doing I/O via GET and PUT and using it as an argument in a PROCEDURE or FUNCTION, you can form set expressions using the following operators:

+ Union of two sets. The resulting set contains all of the elements that are contained in either of the two sets.

- Difference of two sets. The resulting set contains those elements that are contained in the first set which are not also contained in the second set.

* Intersection of two sets. The resulting set contains only those elements that are common to both sets.

In addition to the set operations which result in set values, you can use set operators to produce Boolean values:

= Set equality

<> Set inequality

<= Set inclusion. The result is true if the first set is a subset of the second set.

>= Set containment. The result is true if the second set is a subset of the first set.

IN Set membership. The result is true if the value on the left side of the IN is contained in the set on the right side of the IN.

The last operator is very useful for determining whether a variable or expression falls within a legal range of values. For example:

```
VAR MyChar : Char;
     .
     .
     .
IF MyChar IN ['A'..'Z', 'a'..'z', '0'..'9']
THEN . . .
```

In this case, we are able to test the value in MyChar to determine whether it is alphanumeric and then take some action.

```
03 01CE         ThisChar := ThisLine[I];
03 01DC         Counts[ThisChar] := Counts[ThisChar] + 1;
03 020D         IF ThisChar IN UpperCase.Range THEN
03 0224            UpperCase.Count := UpperCase.Count + 1
03 022B         ELSE IF ThisChar IN LowerCase.Range THEN
03 0249            LowerCase.Count := LowerCase.Count + 1
03 0251         ELSE IF ThisChar IN Special.Range THEN
03 0271            Special.Count := Special.Count + 1
03 0279         ELSE Numeric.Count := Numeric.Count + 1;
03 028E         END;
02 029E
02 029E       END;
01 02A1
01 02A1     FOR ThisChar := FirstChar TO LastChar DO
01 02B9       IF Counts[ThisChar] > 0 THEN
01 02D4         WRITELN (Counts[ThisChar], ' ', ThisChar, '''s');
01 032D
01 032D     WRITELN;
01 0335     WRITELN (UpperCase.Count, ' UPPER CASE');
01 035E     WRITELN (LowerCase.Count, ' LOWER CASE');
01 0388     WRITELN (Numeric.Count, ' NUMERIC');
01 03AF     WRITELN (Special.Count, ' SPECIAL');
01 03D6     WRITELN;
01 03DE     WRITELN (UpperCase.Count + LowerCase.Count + Numeric.Count +
01 03F3              Special.Count, ' TOTAL');
01 0417   END.
```

Other Complex Types

There are two addition complex types that will be discussed in future columns. One is the FILE type which is used to represent I/O devices like disk, printer, screen, keyboard and cassette. There will be an entire column about input / output in which will center around this complex type. The type pointer will be discussed in a future column about dynamic allocation, the heap and linked lists.

Counting Characters Program

This month's sample program analyzes characters that you enter from the keyboard. It counts the numbers of each character (i.e. the number of A's, B's, etc.) as well as the number of characters in each of three classifications. The classifications are:

Uppercase letters
Lowercase letters
Numbers
Special characters

To run the program, you just type in data and ENTERs as much as you want. When you have entered all the data, hit the CLEAR key. The program will then display all of its accumulated totals.

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Hint . . .

Offline Printer Prompt

In order to avoid the annoyance of having a program "hang up" because the printer is turned off or offline, the following prompt can be added to BASIC programs:

10 INPUT"PRINTER READY";K$:IF (PEEK (&HFF22) AND 1) THENLINEINPUT"PRINTER NOT READY";K$:GOTO10

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```
SYMBOL       CLASS     STRUCT ALLOC       DATA TYPE     VALUE     LOW  HIGH  SIZE

CHARCLASS    TYPE      RECORD             CHARCLASS         0       0     0    34
COUNT        FIELD            CHARCLASS   INTEGER          32  -32768 32767     2
COUNTS       VARIABLE  ARRAY  AUTOMATIC   INTEGER        -322      32   122   182
FIRSTCHAR    CONSTANT                     CHAR             32       0     0     1
I            VARIABLE         AUTOMATIC   INTEGER        -406  -32768 32767     2
LASTCHAR     CONSTANT                     CHAR            122       0     0     1
LOWERCASE    VARIABLE  RECORD AUTOMATIC   CHARCLASS       -72       0     0    34
NUMERIC      VARIABLE  RECORD AUTOMATIC   CHARCLASS      -106       0     0    34
RANGE        FIELD     SET    CHARCLASS   CHAR              0       0   255    32
SPECIAL      VARIABLE  RECORD AUTOMATIC   CHARCLASS      -140       0     0    34
THISCHAR     VARIABLE         AUTOMATIC   CHAR           -323       0   255     1
THISLINE     VARIABLE         AUTOMATIC   STRING         -404       0   255    81
UPPERCASE    VARIABLE  RECORD AUTOMATIC   CHARCLASS       -38       0     0    34

STACK REQUIREMENTS:    506



CODE SIZE             1051
UNUSED STACK         32996
MAX SYMBOLS            117
TOTAL ERRORS             0
SOURCE FILE: CNTCHARS:1
OBJECT FILE: CNTCHARS:1
```

The totals for each character are kept in the array Counts. The records UpperCase, LowerCase, Numeric and Special contain both the set of characters in each class and the count of characters found in each class.

The WITH statements at the beginning initialize both the set as well as the count values for each record. Each WITH statement initializes its Range via a set constant. In the last WITH statement the special character range is computed as all those legal characters which are not in any of the other ranges. After this is a FOR loop which zeroes all of the character counts. Next are the WRITELNs which provide the prompt on the screen.

The WHILE loop iterates once per line entered on the keyboard. Inside it is the FOR loop which takes each character in the line and counts and categorizes it. When the CLEAR key is hit, EOF becomes TRUE and control falls through to the code which prints all the counts.

In next month's column we will talk about the most important modular programming constructs in PASCAL: PROCEDUREs and FUNCTIONs.

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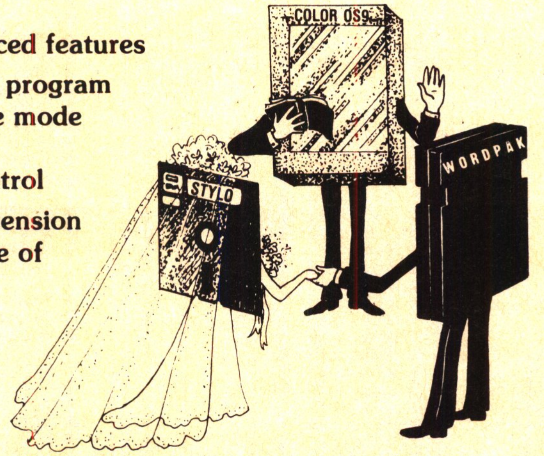

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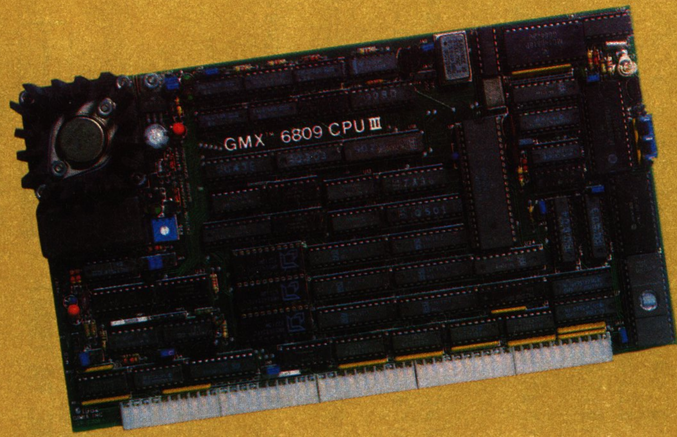

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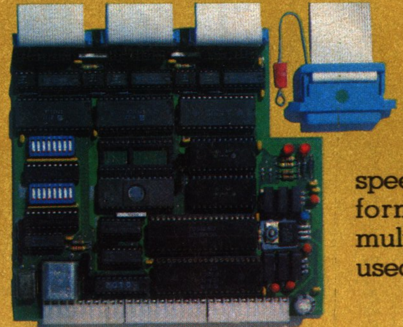

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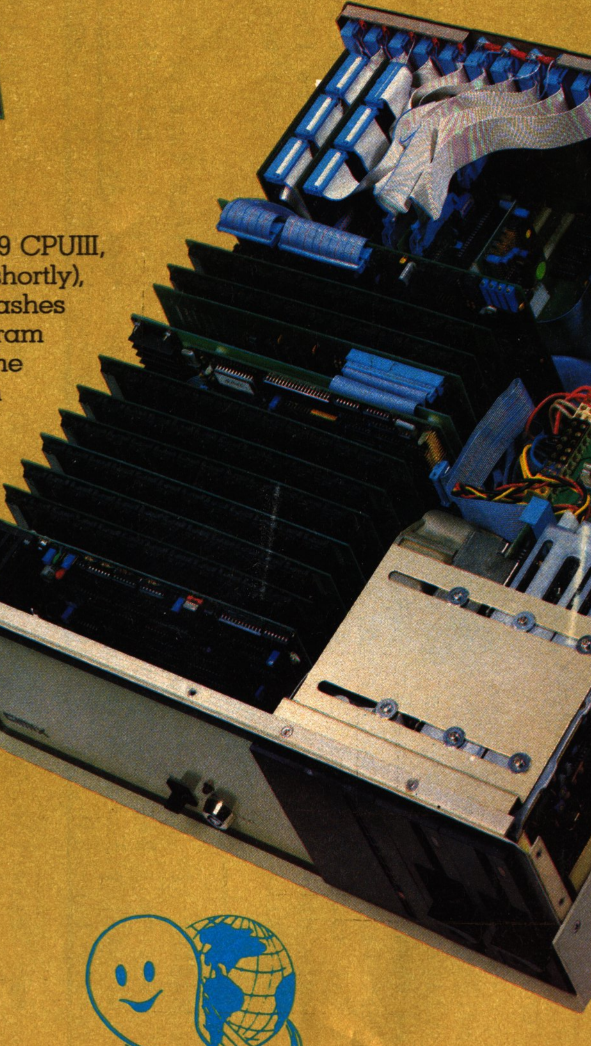

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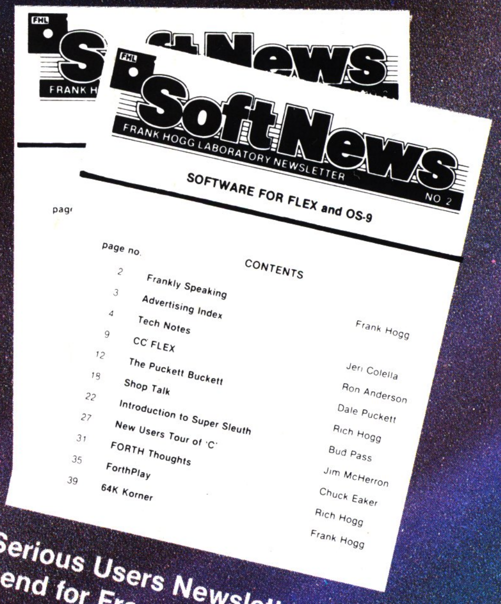

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SOFTWARE FOR FLEX and OS-9

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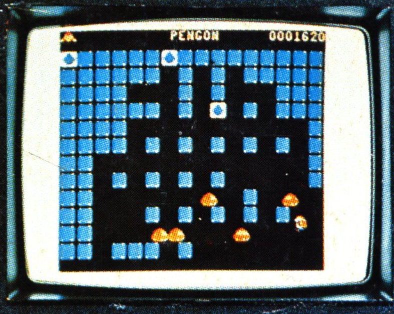

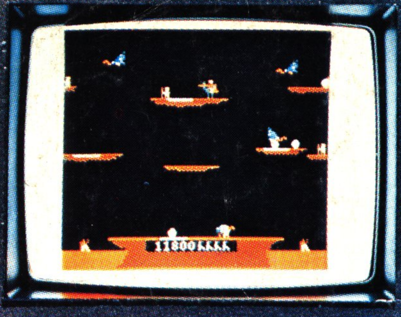

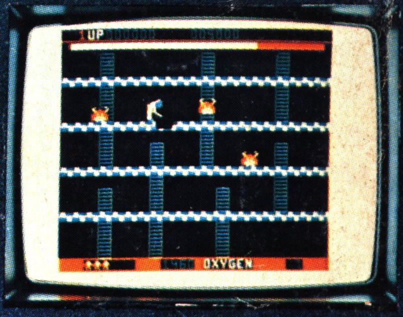

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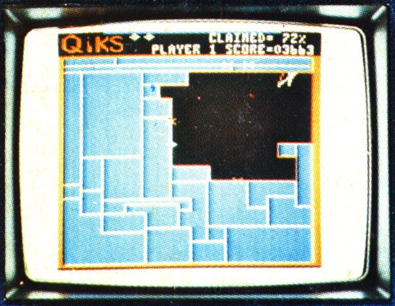

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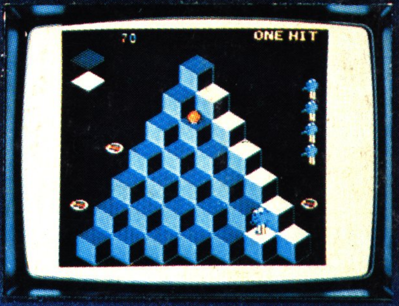
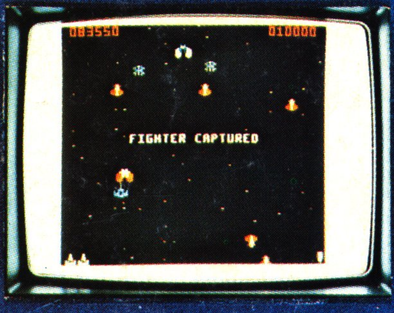
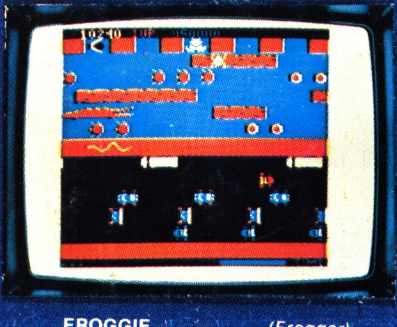
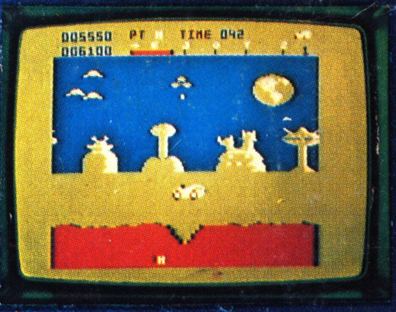


CUBIX *(Q*Bert)*
Sixteen skill levels make this 3-D pyramid game fun for anyone! Sprink the snake is just one of the creatures to look out for. Requires 32K and joysticks.







GALAGON *(Galaga)*
Wave after wave of spiraling attackers trying to capture your fighters. Score big time points during the challenge round. Enjoy! Requires 32K and joysticks.

FROGGIE *(Frogger)*
A race against the clock to get "Froggie" home safely is a worthy challenge for anyone! Crossing a busy highway and avoiding a pesky otter are some of the hazards. Requires 32K and joysticks.

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